VOLUME 27 AUGUST 1934 NUMBER 8

Southern Medical Journal

Journal of the Southern Medical Association

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Ala. Annual subscription $4.00. Entered as Second-Class Matter at the Post Office at Birmingham, Ala., under act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Sec. 1103, Act of March 3, 1917, authorized Dec. 20, 1921.

Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16

TABLE OF CONTENTS

Intraventricular Tumors of the Cerebrum: A Study of Eight Cases, Including Two Lateral Ventricle Meningiomas. Edgar F. Fincher, Jr., Atlanta, Georgia 667

Discussed by J. G. Lyerly, Richmond, Va.; W. Gayle Crutchfield, Richmond, Va.

After-Effects of Irritant Gases: Residual Pulmonary Lesions. Amos R. Koontz, Baltimore, Maryland 676

Discussed by Claude Moore, Washington, D. C.; L. Freeland Magruder, Norfolk, Va.

Radium Treatment of Epithelioma of the Eyelid. Howard Hailey, Atlanta, Georgia 681

Discussed by L. W. Ketron, Baltimore, Md.; Chas. O. King, Birmingham, Ala.; M. T. Van Studdiford, New Orleans, La.; H. M. Robinson, Baltimore, Md.

Visualization of the Liver and Spleen as a Diagnostic Aid in Abdominal Conditions. Joseph E. Hirsh and B. F. Morton, Birmingham, Alabama 683

Roentgen Ray Study of the Prostatic Urethra with Special Reference to Resection. W. W. S. Butler, Jr., and C. H. Peterson, Roanoke, Virginia 690

Discussed by Wm. H. Toulson, Baltimore, Md.

Thymic Dangers. Roy E. de la Houssaye, New Orleans, Louisiana 694

Discussed by St. Geo. T. Grinnan, Richmond, Va.; J. LaBruce Ward, Asheville, N. C.; M. Pinson Neal, Columbia, Mo.; William B. McIlwaine, Petersburg, Va.

Continued on Next Page

BECKMAN'S TREATMENT IN PRACTICE

New 1934 Edition Now Ready

DR. BECKMAN'S most unusual work is sweeping the medical world with its success. Since the first medical book appeared there has never been published another work like this single-volume book devoted entirely to PRACTICAL TREATMENT. Dr. Beckman discusses treatment as you must select it, plan it and apply it in your office or at the bedside of your patients. He speaks in practical terms—patients, prescriptions, diets, drugs, nursing care, etc. He gives you clear counsel on the treatment of every disease. He considers thoroughly the new things in treatment, the new drugs, new methods, new ideas, which have proved their place in medical practice. He gives you a guide—a guide not only to what is best, but when and where and how. Into this one volume Dr. Beckman has packed the meat of three.

From the London Lancet:

"This book or its equivalent should be in the hands of every physician—and we have not yet come across its equivalent."

Treatment in General Practice. By Harry Beckman, M.D., Professor of Pharmacology, Marquette University. Octavo of about 900 pages. Cloth, $10.00 net

SEND ORDERS TO

NEW ORLEANS J. A. MAJORS COMPANY DALLAS

TABLE OF CONTENTS—Concluded

Thrombo-Angiitis Obliterans as a General Vascular Disease. Thomas P. Sprunt, Baltimore, Maryland 698
Discussed by Wm. B. Porter, Richmond, Va.; Harry C. Schmeisser, Memphis, Tenn.; Louise M. Ingersoll, Asheville, N. C.

Traumatic Arteriovenous Aneurysm: Report of a Case Involving the Posterior Tibial Vessels of Both Legs, With a Summary Discussion of the Literature on Arteriovenous Aneurysm. W. H. Parsons and W. G. Weston, Vicksburg, Mississippi 703
Discussed by G. Paul LaRoque, Richmond, Va.; Rudolph Matas, New Orleans, La.

Fractures of the Os Calcis. J. Edgar Stewart, St. Louis, Missouri 711
Discussed by H. Earle Conwell, Birmingham, Ala.; Robert Carothers, Cincinnati, O.

Rupture of the Bladder. Edgar G. Ballenger, Omar F. Elder and Harold P. McDonald, Atlanta, Georgia 713

Experimental Pneumococcal Nephrosis and Its Relation to Glomerulonephritis. S. S. Blackman, Jr., Baltimore, Maryland 715

Sinus Thrombosis and Thrombophlebitis Complicating Mastoiditis: Case Reports. E. G. Gill, Roanoke, Virginia 718
Discussed by Thomas E. Hughes, Richmond, Va.; B. P. Woodson, Temple, Tex.

Trachoma in the Native White Population of the United States. C. E. Rice and Avery A. Drake, Rolla, Missouri 728
Discussed by W. F. Lunsford, Jefferson City, Mo.; A. T. McCormack, Louisville, Ky.

Transverse Rupture of the Aorta: Relationship to Sudden Death with Theories Concerning the Etiology and Mechanics of Its Occurrence. Jack Clayton Norris, Atlanta, Georgia 733

Teaching Bacteriology as a Part of the Function of the Depatment of Medicine. David T. Smith, Durham, North Carolina 734

The Teaching of Bacteriology in a Department of Medicine. Ralph S. Muckenfuss, St. Louis, Missouri 735
Papers of Dr. Smith and Dr. Muckenfuss discussed by Kenneth F. Maxcy, University, Va.; Russell H. Oppenheimer, Emory University, Ga.

Classical Cesarean Section for Fulminating Eclampsia with Subarachnoid Hemorrhage and Pyelitis. Greer Baughman, Richmond, Virginia 738

EDITORIALS 740
- The San Antonio Meeting
- Sudden Emptying of the Distended Urinary Bladder
- Gleanings from Recent Journals
- Twenty-Five Years Ago

SAN ANTONIO, WHERE WE MEET 743
- The Alamo, "Shrine of Texas Liberty"

AFTER SAN ANTONIO, MEXICO 744
- Mexico City

BOOK REVIEWS 746

SOUTHERN MEDICAL NEWS 18

UNIVERSITY of MARYLAND, SCHOOL of MEDICINE and COLLEGE of PHYSICIANS and SURGEONS

Requirements for Admission—Two years of college work, including English, Chemistry, Biology, Physics and one year in a modern foreign language, in addition to an approved four year high school course.

Facilities for Teaching—Abundant laboratory space and equipment. Two large general hospitals absolutely controlled by the faculty and several hospitals devoted to specialties, in which clinical teaching is done.

For catalogue apply to **J. M. H. Rowland, M. D., Dean, N. E. Cor. Lombard and Greene Streets, Baltimore, Md.**

LIPPINCOTT BOOKS

Attached is a review which appeared in the Journal of the American Medical Association, June 16, 1934.

Operative Gynecology. By Dr. H. v. Peham, Privy Councillor, Professor of Obstetrics and Gynecology, and Dr. J. Amreich, Privatdozent for Obstetrics and Gynecology of the University, Vienna. In Two Volumes. With an introduction to the edition in English by George Gellhorn, M.D., Professor of Clinical Obstetrics and Gynecology, Washington University School of Medicine, St. Louis, Mo. Authorized translation made by L. Kraeer Ferguson, M.D. Associate in Surgery, University of Pennsylvania. Cloth. Price, $25 per set. Pp. 779, with 467 Illustrations. Philadelphia and London: J. B. Lippincott Company, 1934.

This monumental work is divided into three parts. The first part, on general principles, is devoted to a discussion of asepsis and antisepsis, anesthesia, preoperative and postoperative treatment, postoperative complications and their therapy, hemorrhage and hemostasis, and methods of opening the abdomen. In the second part the surgical anatomy of the female pelvis is described. It is recognized today, more than ever before, that a well developed anatomic background is a requisite for a successful operative experience. In this book the pelvic connective tissue, ureters, arteries, veins and lymphatics of the genital system and rectum and the nerve supply are described in greater detail than can be found in any other book of this kind. The authors' own dissections are reproduced in pictures of startling perfection. The colored full page illustrations, accompanied by extensive explanatory legends, come close to actual work on the cadaver. The part on operative technic follows that on anatomy; it starts with a graphic description of the radical abdominal and vaginal hysterectomy. The flowing style is as enjoyable and instructive as the pictorial accompaniment. All the other operations are presented with the same wealth of detail, the surgical procedures being described step by step. Indications for each operation, based on contemporary literature and the authors' own experiences, are discussed at length, thus contributing to perfection of surgical judgment of the reader. Selectiveness of tried operative methods cannot be considered as a shortcoming. Of course, there occur minor differences in the approach to certain problems as compared to ideas prevalent in America. For instance, discussion of ethylene anesthesia has been omitted; Jansky's and the international classification of blood grouping and paraffin (Percy) method of blood transfusion are not described; the use of dextrose injections in postoperative treatment is not mentioned. The excellent quality of paper and the large type contribute to the reader's enjoyment. All in all, this treatise represents an unusual combination of art and science that cannot be too highly recommended.

NRA

J. B. LIPPINCOTT COMPANY

LONDON Since 1875 16 John St., Adelphi

PHILADELPHIA Since 1792 East Washington Square

MONTREAL Since 1897 Confederation Bldg.

hot off the press!

★ ★ ★ SURGERY OF A GENERAL PRACTICE

By A. E. Hertzler
Halstead, Kan.
600 pages, 472 Illus.
Price, $10.00

As its name implies this new book covers just the things that the general practitioner should do in the surgical field. Doctor Hertzler knows the problems of a surgical nature that confront the general practitioner. He attempts to solve these problems in this book, giving detailed instructions for each surgical procedure.

TUBERCULOSIS In the CHILD and ADULT ★ ★ ★

This disease, formerly leading as a mortality cause, now ranks seventh, due to a better understanding of the infection. A study of this book will give you a firmer foundation for the treatment of tuberculosis. It covers pathologic anatomy, pathologic physiology, immunology, diagnosis and treatment of tuberculosis.

By F. M. Pottenger
Monrovia, Calif.
600 pages, 85 Illus.
Price, $8.50

★ ★ ★

SPINAL ANESTHESIA

By Geo. R. Vehrs
Salem, Ore.
269 pages, 81 Illus.
Price, $5.50

The wide adoption of spinal analgesia by larger and more important hospitals and clinics has created a demand for a volume correlating well-known and proved facts on this subject. This book constitutes a survey of the experimental and clinical records in the field of spinal anesthesia. With almost 70% of the surgery of today being done under spinal anesthesia there is a real need for this new book.

Examine These Books At Our Risk

Send for these new books at our risk. Look them over for 10 days. Monthly payments gladly arranged if desired.

THE C. V. MOSBY CO., S.M.J.-Au.-34
3525 Pine Blvd.,
St. Louis, Mo.

Gentlemen: Send me the books checked with (X), charging my account:

- ☐ Hertzler—"Surgery of a General Practice" $10.00
- ☐ Pottenger—"Tuberculosis in the Child and Adult" 8.50
- ☐ Vehrs—"Spinal Anesthesia" 5.50

Dr._____

Address_____

ELI LILLY AND COMPANY

FOUNDED 1876

Makers of Medicinal Products

EPHEDRINE INHALANTS

Lilly

Ephedrine shrinks the nasal mucous membrane and stimulates ciliary action. It reduces congestion, improves nasal respiration, and helps to maintain the sinus openings and promote drainage. The action of ephedrine is prompt and well sustained. Daily use over a prolonged period does not usually alter the rapidity or duration of action.

Inhalant Ephedrine Compound, Lilly, contains ephedrine 1 percent, with menthol, camphor, and oil of thyme, in a neutral paraffin oil.

Inhalant Ephedrine (Plain), Lilly, contains ephedrine (in the form of ephedrine cinnamic aldehyde and ephedrine benzaldehyde) 1 percent, in an aromatized paraffin oil.

Prompt Attention Given to Professional Inquiries

PRINCIPAL OFFICES AND LABORATORIES, INDIANAPOLIS, INDIANA, U.S.A.

A new deal

in the treatment of

MALARIA

EXCEPT in severe cases requiring a stay at home or in a hospital, the 5 day treatment with Atabrine enables the malaria patient to follow his occupation without the discomforts of prolonged quinine medication. Relapses occur less frequently. Owing to this short period of administration and the general absence of by-effects, the treatment can be carried out effectively even in persons who otherwise might not follow directions. Atabrine can also be given in blackwater fever and during pregnancy.

NRA MEMBER U.S. WE DO OUR PART

ATABRINE

Reg. U. S. Pat. Off. & Canada
Brand of CHINACRIN

WINTHROP CHEMICAL COMPANY, INC.

Pharmaceuticals of Merit for the Physician

NEW YORK, N. Y. WINDSOR, ONT.

Factories: Rensselaer, N. Y.—Windsor, Ont.

TRADE **PYRIDIUM** MARK

PHENYLAZO-ALPHA-ALPHA-DIAMINO-PYRIDINE MONO-HYDROCHLORIDE. MFD. BY PYRIDIUM CORP., N. Y.

"Good afternoon doctor... are you prescribing Pyridium?"

IN CASE you have never given Pyridium a trial, may we suggest that you do not delay further in taking advantage of its usefulness. It is very valuable for the alleviation of the distressing symptoms that often accompany genito-urinary infections, as well as in the treatment of these infections.

MERCK & CO. INC. • Rahway, N. J.
MANUFACTURING CHEMISTS

WYALIN

Promoting Elimination in *Upper Intestinal* Disorders

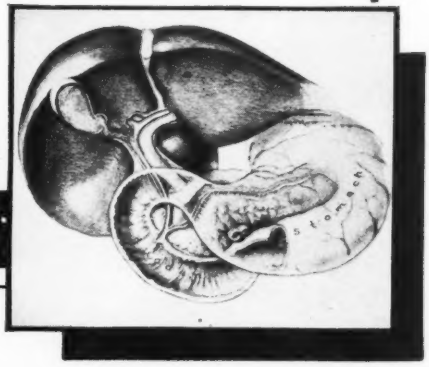
Among the causes of bowel sluggishness may be mentioned congestion at the Ampulla of Vater or anywhere along the biliary or pancreatic tracts. Deficient secretion of bile by the liver may also be a primary cause.

When the symptoms and findings lead to a diagnosis of trouble in the upper intestine and its associated ducts, WYALIN is indicated.

WYALIN acts as a natural cholagogue; contains no phenolphthalein; supplies physiologically standardized pancreatic enzymes, and also increases the tone and directly assists bowel action.

Of especial value in biliary disturbances, WYALIN is also of great value in intestinal stasis and other bowel conditions where a digestant and gentle laxative are required.

CONTAINS NO PHENOLPHTHALEIN



JOHN WYETH & BROTHER, Inc.
PHILADELPHIA, PA. and WALKERVILLE, ONT.

For X-Ray Films Presenting Exceptionally Good Diagnostic Detail . . . The Model DRF Shock Proof X-Ray Unit

An Ideal Apparatus for Office Practice

IF you could see the quality of radiographic work produced with the DRF Shock Proof X-Ray Unit, in all probability you'd be as surprised as many other physicians to realize the possibilities with this nominally priced equipment.

The explanation is simple enough: The special Coolidge tube used in the DRF Unit utilizes the Benson focus with an extremely small effective focus—the smallest ever incorporated in a Coolidge tube. As diagnostic detail is enhanced as the area of effective focus is decreased, it readily explains why radiographs produced with the DRF Unit are of an unusually fine diagnostic quality.

The only question can be whether such radiographs are produced with sufficiently short exposures for the range of diagnostic work you desire to do in your practice. Consider then the following exposure values applying to Model DRF which are indicative of its range:

Region	*Dist.*	*Expos. Sec.*
*Shoulder, AP—PA	25″	¼
*Sinus, Frontal, PA	22″	5
*Spine, Lumbar, AP	25″	4
*Spine, Lumbar, Lat.	25″	20
*Pelvis, AP	25″	3
Chest, PA	48″	¼
Stomach, PA	20″	½

These exposure values are based on an average size adult, and the use of Rayspeed Cassettes and Hi-Speed Intensifying Screens. Those marked are with the Bucky diaphragm.*

If the above exposure values fall within your requirements, the DRF Unit is a most logical selection to enable you to produce an unusually fine quality of radiographic work.

The DRF is completely oil-immersed, 100% electrically safe, impervious to atmospheric conditions such as dust and moisture, and operates at the same high efficiency regardless of altitude.

Not until the introduction of the principle of oil-immersion of the x-ray tube was it possible to obtain the flexibility and simplicity of application in radiographic and fluoroscopic diagnosis as now realized with the DRF Unit.

Get all the facts on the DRF. We will gladly send them on request

GENERAL ELECTRIC X-RAY CORPORATION
2012 JACKSON BLVD. *Branches in Principal Cities* **CHICAGO, ILLINOIS**

THE NEW YORK POLYCLINIC
MEDICAL SCHOOL AND HOSPITAL
(ORGANIZED 1881)

(The Pioneer Post-Graduate Medical Institution in America)

For the General Surgeon

A combined surgical course comprising General Surgery, Traumatic Surgery, Abdominal Surgery, Gastro-Enterology, Proctology, Gynecological Surgery, Urological Surgery, Thoracic Surgery, Pathology, Roentgenology, Physical Therapy, Operative Surgery and Operative Gynecology on the Cadaver.

ROENTGENOLOGY

FOR INFORMATION ADDRESS
MEDICAL EXECUTIVE OFFICER: 345 West 50th Street, NEW YORK CITY

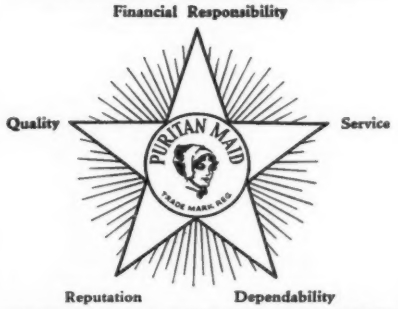
Bacterial Antigen
MADE FROM
Streptococci
(Wyatt-Hicks)

U. S. Government License No. 112

An antigen of the Shwartzman type combined with a vaccine for intravenous use in the treatment of Chronic Infectious Arthritis.

The Wyatt Clinic
RESEARCH LABORATORIES
Tucson, Arizona

What's Around the "Puritan Maid" Trade Mark?



THESE FIVE POINTS ARE YOUR PROTECTION AND GUARANTEE

Puritan Compressed Gas Corp.

Manufacturers of
NITROUS OXID—OXYGEN—ETHYLENE—CARBON DIOXID—CARBON DIOXID-OXYGEN MIXTURES
ALL TYPES OF GAS EQUIPMENT—OXYGEN TENTS, INHALING OUTFITS, ETC.
Offices in Principal Cities

Washington University
SCHOOL OF MEDICINE

OFFERS

An intensive four weeks' course in

PEDIATRICS

for graduates. Next course begins October 1st.

For full information, address
DR. W. McKIM MARRIOTT
Washington University School of Medicine,
St. Louis, Missouri

The Ella Oliver Home

A private maternity home for the care and protection of unfortunate girls during pregnancy and confinement.

Under auspices of Women's Christian Association of this city.

Staff physician in daily attendance or may have any other ethical physician. Modern hospital equipment, graduate nurse. Rates very reasonable. Adoption or board arranged for babies.

Strictest privacy is maintained, correspondence confidential.

For information, address

Ella Oliver Home, 903 Walker Avenue, Memphis, Tenn., Phone 3-0639

The Tulane University of Louisiana

GRADUATE SCHOOL OF MEDICINE

Postgraduate instruction offered in all branches of medicine. Courses leading to a higher degree have also been instituted.

A bulletin furnishing detailed information may be obtained upon application to the

DEAN
GRADUATE SCHOOL OF MEDICINE

1430 Tulane Avenue
New Orleans, Louisiana

APPALACHIAN HALL
ASHEVILLE, NORTH CAROLINA

● **An institution for rest, convalescence, the diagnosis and treatment of nervous and mental disorders, alcohol and drug habituation.**

APPALACHIAN HALL is located in Asheville, North Carolina. Asheville justly claims an unexcelled all year round climate for health and comfort. All natural curative agents are used, such as physiotherapy, occupational therapy, outdoor sports, horseback riding, etc. Five beautiful golf courses are available to patients. Indoor sports consist of billiards, pool, ping-pong, gymnastic exercises. Two dances are given each week in the spacious ballroom, the other evenings are occupied with games and other entertainments.

Ample facilities for classification of patients. Rooms single or en suite with every comfort and convenience.

For rates and further information write Appalachian Hall.

WM. RAY GRIFFIN, M.D.
M. A. GRIFFIN, M.D.

WESTBROOK SANATORIUM

Richmond *Virginia*

Telephone—Boulevard 1220

Department for Men:
J. K. Hall, M.D.
O. B. Darden, M.D.

Department for Women:
P. V. Anderson, M.D.
J. H. Royster, M.D.
E. H. Alderman, M.D.

The institution is situated just beyond the northern border of the city on the Richmond-Washington automobile highway.

The scope of the work of the Sanatorium is limited to the diagnosis and the treatment of nervous and mental disorders and to the addictions to drugs and to alcohol. It affords also adequate facilities for rest and upbuilding under medical and nursing supervision.

The medical staff devotes its entire attention to the patients in the Sanatorium.

The institution maintains a school for trained attendants in which instruction in the care of the nervous and mentally sick is emphasized.

There are twelve separate buildings for patients, with 150 beds. Such a large group of buildings makes possible the more congenial grouping of patients. Rooms may be had single or en suite, with or without private bath. There are a few small cottages for the use of individual patients.

A comprehensive general physical and nervous examination is made of each patient. A mental examination is made when indicated. The examination is typed and a copy of it is available for the referring physician. Complete x-ray equipment has been installed. A dental room has been fitted up and a complete dental investigation is a part of the general survey.

A skilled teacher gives practical daily instruction to small groups in the arts and crafts. Helpful and interesting occupation in the out-of-doors is made possible for the men patients in the vegetable and flower gardens, on the truck farm, in the poultry yards, and in the dairy.

There are bowling, tennis, croquet, and pool. There is a movie and a dance every week. On Sunday evening there is chapel service.

Detailed information is available for physicians.

Brawner's Sanitarium

ATLANTA, GEORGIA

For Mental and Nervous Diseases

A modern neuropsychiatric hospital with special laboratory facilities for the study and treatment of early cases. Also a department for the treatment of drug and alcoholic addictions.

The Sanitarium is located on the Marietta Electric Car Line ten miles from the center of Atlanta, near Smyrna, Georgia. The grounds comprise 80 acres. The buildings are steam heated, electrically lighted, and many rooms have private baths.

Address communications to Brawner's Sanitarium, Smyrna, Georgia, or to the city office, 478 Peachtree Street, Atlanta, Georgia.

Dr. Jas. N. Brawner, Medical Director.
Dr. Albert F. Brawner, Resident Physician.

ARLINGTON HEIGHTS SANITARIUM

P. O. BOX 1120, FORT WORTH, TEXAS

For Nervous Diseases and Selected Cases of Mental Diseases

(Incorporated under laws of Texas)

BRUCE ALLISON, M.D.
Superintendent

JAS. D. BOZEMAN, M.D.
Resident Physician

DRS. W. L. ALLISON and JNO. S. TURNER
Consultants

McGUIRE CLINIC

ST. LUKE'S HOSPITAL

Richmond, Virginia

. . . Medical and Surgical Staff . . .

General Medicine:
James H. Smith, M.D.
Hunter H. McGuire, M.D.
Margaret Nolting, M.D.
John Powell Williams, M.D.
Kinloch Nelson, M.D.
Clifford H. Beach, M.D.

Orthopedic Surgery:
William T. Graham, M.D.
D. M. Faulkner, M.D.
J. T. Tucker, M.D.

General Surgery:
Stuart McGuire, M.D.
W. Lowndes Peple, M.D.
Carrington Williams, M.D.
W. P. Barnes, M.D.

Pathology and Radiology:
S. W. Budd, M.D.

Roentgenology:
J. L. Tabb, M.D.

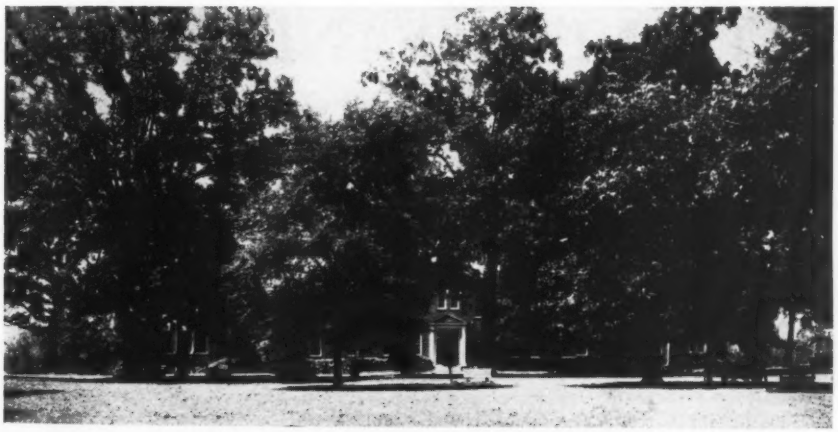
Obstetrics:
H. Hudnall Ware, Jr., M.D.

Urology:
Austin I. Dodson, M.D.

Eye, Ear, Nose and Throat:
F. H. Lee, M.D.

Dental Surgery:
John Bell Williams, D.D.S.
Guy R. Harrison, D.D.S.

WALTER R. WALLACE, M.D. **HUGH W. PRIDDY, M.D.**



THE WALLACE SANITARIUM

MEMPHIS, TENN.

For the treatment of Drug Addiction, Alcoholism, Mental and Nervous Diseases. Fully equipped for the care of patients admitted. Sixteen acres of beautiful grounds. Located in the eastern suburbs of the city at Southern Ave. and Cherry Road.

St. Elizabeth's Hospital

RICHMOND, VIRGINIA

Staff

J. Shelton Horsley, M.D., Surgery and Gynecology
John S. Horsley, Jr., M.D., Plastic and General Surgery
Guy W. Horsley, M.D., General Surgery
Douglas G. Chapman, M.D., Internal Medicine
Wm. H. Higgins, M.D., Consultant in Internal Medicine
Austin I. Dodson, M.D., Urology
Fred M. Hodges, M.D., Roentgenology
Thos. W. Wood, D.D.S., Dental Surgery
Helen Lorraine, Medical Illustration

Assistant Attending Staff

Harry J. Warthen, Jr., M.D., Surgery
W. K. Dix, M.D., Internal Medicine
J. P. Baker, Jr., M.D., Internal Medicine
Marshall P. Gordon, Jr., M.D., Urology

Administration

N. E. Pate ..... Business Manager

SCHOOL FOR NURSES

The Training School is affiliated with **Johns Hopkins Hospital** in Baltimore for a three months' course each, in Pediatrics and Obstetrics. All applicants must be graduates of a high school or have the equivalent education.

Address: DIRECTOR OF NURSING EDUCATION

THE TUCKER SANATORIUM, INC.

212 West Franklin St. (Corner of Madison)

RICHMOND, VIRGINIA

This is the Private Sanatorium for the Neurological Practice of Drs. Beverley R. Tucker, Howard R. Masters and James Asa Shield.

The Tucker Sanatorium is for the treatment of nervous and endocrine diseases. There are departments of massage, medicinal exercises, hydrotherapy and physiotherapy. The Sanatorium is large and bright, surrounded by a lawn and shady walks, large verandas and has a roof garden. It is situated in the best part of Richmond and is thoroughly and modernly equipped. The nurses are specially trained in the care of nervous cases.

Insane and acute alcoholic cases are not taken.

CITY VIEW SANITARIUM

For MENTAL and NERVOUS DISEASES and ADDICTIONS

ESTABLISHED IN 1907

AN ENTIRELY NEW PLANT ERECTED IN 1922

Separate buildings for men and women, ideally arranged and equipped with every facility for the comfort, care and treatment of the class of patients received. Situated in the midst of a fifty-acre tract, and surrounded by large groves and attractive lawns. Two resident physicians. Training school for nurses.

References: The Medical Profession of Nashville

JOHN W. STEVENS, M.D., Physician-in-Charge

NASHVILLE R. F. D. No. 1 TENNESSEE

On Murfreesboro Pike, one-half mile east of old location

STUART CIRCLE HOSPITAL

Richmond, Va.

Medicine:
ALEXANDER G. BROWN, JR., M.D.
MANFRED CALL, M.D.
MANFRED CALL, III, M.D.

Surgery:
ROBERT C. BRYAN, M.D.
STUART N. MICHAUX, M.D.
CHARLES R. ROBINS, M.D.
A. STEPHEN GRAHAM, M.D.

Obstetrics:
GREER BAUGHMAN, M.D.
BEN H. GRAY, M.D.
WM. DURWOOD SUGGS, M.D.

Ophthalmology, Otolaryngology:
CLIFTON M. MILLER, M.D.
R. H. WRIGHT, M.D.
W. L. MASON, M.D.

Urological Surgery:
JOSEPH F. GEISINGER, M.D.

Oral Surgery:
GUY R. HARRISON, D.D.S.

Pathology:
REGENA BECK, M.D.

Physiotherapy:
ELSA LANGE, B.S.
Technician

Roentgenology and Radiology:
FRED M. HODGES, M.D.
L. O. SNEAD, M.D.

Stuart Circle Hospital was organized and has been operated for twenty years with certain additions and improvements affording scientific care to patients in General Medicine, Surgery, Obstetrics and the various medical and surgical specialties. Detailed information furnished physicians.

CHARLOTTE PFEIFFER, R.N., Superintendent

DR. MOODY'S SANITARIUM

SAN ANTONIO, TEXAS

315 Brackenridge Avenue **Phone Fannin 5522**

For Nervous and Mental Diseases, Drug and Alcohol Addiction and Nervous Invalids Needing Rest and Recuperation

Established 1903. Strictly ethical. Location delightful summer and winter. Approved diagnostic and therapeutic methods. Seven buildings, each with separate lawns, each featuring a small separate sanitarium, affording wholesome restfulness and recreation, in doors and out doors, tactful nursing and homelike comforts.

G. H. Moody, M.D.
Founder

J. A. McINTOSH, M.D., F.A.C.P.
Superintendent

Grace Lutheran Sanatorium FOR TUBERCULOSIS

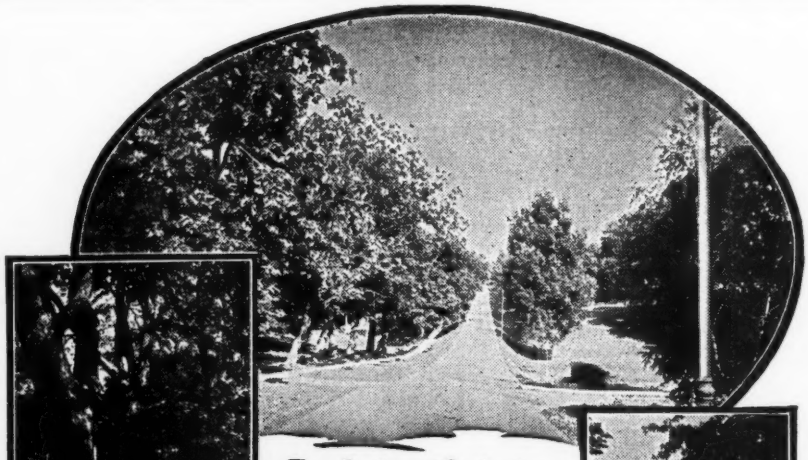
SAN ANTONIO, TEXAS

ADMITS patients irrespective of religion or creed. An attractive institution in beautiful San Antonio. Climate unexcelled the year round for treatment of tuberculosis. Private rooms with bath and sleeping porch; individual cottages; high-class accommodations; Radiographic and Fluoroscopic service. Every room and cottage equipped with radio.

MODERATE RATES

For booklet and information address

REV. PAUL F. HEIN, D. D., Superintendent
P. O. Box 214 San Antonio, Texas



The Cincinnati Sanitarium
Inc. 1873

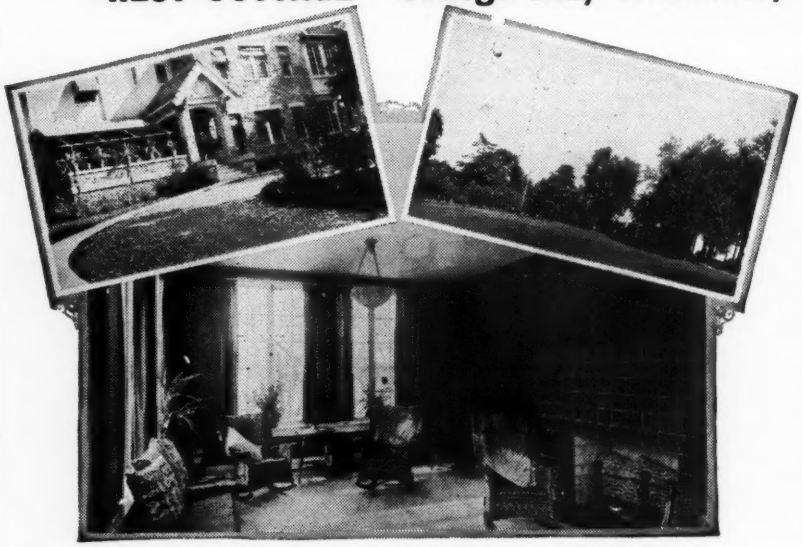
For Mental and Nervous Diseases

A strictly modern hospital fully equipped for the scientific treatment of nervous and mental affections. Situation retired and accessible. For details write for descriptive pamphlet.

Emerson A. North, M.D.,
Charles Kiely, M.D.,
Visiting Consultants
D. A. Johnston, M.D.,
Medical Director

H. P. COLLINS, Business Manager
Box No. 4, College Hill
CINCINNATI, OHIO

"REST COTTAGE" College Hill, Cincinnati, Ohio



For purely nervous cases, nutritional errors and convalescents.

Completely equipped for hydrotherapy, massages, etc.

Cuisine to meet individual needs.

Emerson A. North, M.D.
Charles Kiely, M.D.
Visiting Consultants

D. A. Johnston, M.D., Medical Director

H. P. Collins, Bus. Mgr., Box No. 4, College Hill, Cincinnati, Ohio.

HILL CREST SANITARIUM

FOR NERVOUS AND MENTAL DISEASES AND ADDICTIONS

Established in 1925

A NEW HOSPITAL HAS BEEN ERECTED

Thoroughly modern in architecture and construction. Eight departments—affording proper classification of patients. All outside rooms, attractively furnished. Several bathrooms and rooms with private bath on each floor. Also a spacious sun parlor in each department. Located on the crest of Higdon Hill, 1050 feet above sea level, overlooking the city, and surrounded by an expanse of beautiful woodland. Ample provision made for diversion and helpful occupation. Adequate night and day nursing service maintained.

JAMES A. BECTON, M.D., Physician-in-Charge

P. O. Box 96, Woodlawn Station, Birmingham, Ala. Phones: 9-1151 and 9-1152

Consultants: C. M. Rudulph, M.D.; H. S. Ward, M.D.

WAUKESHA SPRINGS SANITARIUM

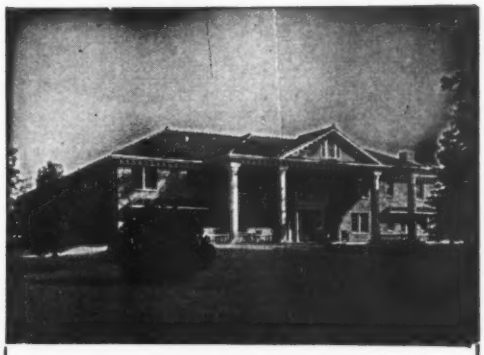
For the Care and Treatment of

NERVOUS DISEASES

Building Absolutely Fireproof

BYRON M. CAPLES, M.D., Medical Director
FLOYD W. APLIN, M.D.

Waukesha, - - - Wisconsin



The Oxford Retreat

Oxford, Ohio

FOR

NERVOUS
AND
MILD MENTAL CASES

R. HARVEY COOK
Physician in Chief

Write for Descriptive Circular

Seven Years' Use has demonstrated the value of the

SURGICAL SOLUTION of

Mercurochrome H.W. & D.

in Preoperative Skin Disinfection

THIS preparation contains 2% Mercurochrome in aqueous-alcohol-acetone solution and has the advantages that:

Application is not painful.
It dries quickly.
The color is due to Mercurochrome and shows how thoroughly this antiseptic agent has been applied.
Stock solutions do not deteriorate.

Now available in 4, 8, and 16 oz. bottles and in special bulk package for hospitals.

Literature on request

This seal denotes acceptance of Mercurochrome for New and Nonofficial Remedies by the Council on Pharmacy and Chemistry of the American Medical Association.

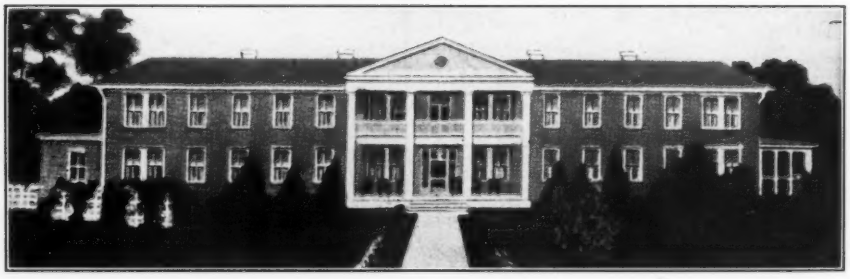
ACCEPTED AMERICAN MEDICAL ASSN.

Hynson, Westcott & Dunning, Inc.
BALTIMORE, MARYLAND

THE NEW FENWICK SANITARIUM, COVINGTON, LA.

Over 41 Years of Successful Operation

QUALITY



SERVICE

MAIN BUILDING

For Mild Mental and Nervous Diseases, Drug and Liquor Addictions and Infirmities of Old Age.

The Sanitarium Buildings are new and of pressed brick, steel and concrete construction. They are located on well kept grounds with lawns, shrubs, and shade trees. Equipped with steam heat, fire protection and all modern conveniences for the scientific care and treatment of these cases. Each case is individual and given personal care and attention. All patietns are given thorough examination and all newer methods of diagnosis used, such as, the chemistry of the blood, spinal fluid, secretion and excretions of the body—our clinical laboratory is complete and operated by trained technicians. Also complete Basal Metabolism outfit. A quiet and refined atmosphere pervades this institution. Rest and Quiet are cardinal features. A trained staff of physicians, all members of the American Medical Association. Sanitarium is registered by the A. M. A. and is member of the American and State Hospital Associations. Dr. F. F. Young, Manager and Physician-in-Chief.

We are in the center of the Ozone Belt, less than two hours from New Orleans

SOUTHERN MEDICAL JOURNAL

JOURNAL OF THE SOUTHERN MEDICAL ASSOCIATION

PUBLISHED MONTHLY BY THE SOUTHERN MEDICAL ASSOCIATION AT BIRMINGHAM, ALA.

Volume 27 AUGUST 1934 Number 8

INTRAVENTRICULAR TUMORS OF THE CEREBRUM*

A STUDY OF EIGHT CASES, INCLUDING TWO LATERAL VENTRICLE MENINGIOMAS

By EDGAR F. FINCHER, JR., M.D.,
Atlanta, Georgia

In a series of eighty-two verified tumors of the brain, eight of the growths were located within the cerebral ventricles. These eight cases are too few to warrant any statistical studies, but occurring in approximately 10 per cent of a small tumor series should attract the attention of the neurosurgeon. The variable ocular and visual field findings should arouse the diagnostic suspicions of the ophthalmologist. The localizing symptoms which, in a majority of instances, were misleading, should be a diagnostic caution to the neurologist; and to the family physician, who is usually the first consulted, some of the surgical problems and pitfalls are illustrated in these cases.

Case 1 (30209).—Left lateral ventricle meningioma. Complete removal (Dowman). Recovery.

September 16, 1930, a woman, aged 35 years, was referred by Dr. Hugh Cochran, of Atlanta, Georgia.

History.—(1) She had had headaches in September, 1928, right frontal in location and intermittent in duration, and in May, 1930, right occipitofrontal headaches of constant duration. (2) Vomiting began in September, 1928, usually associated with headaches and definitely projectile in character. (3) Visual hallucinations in September, 1928, were described as "colored wheels" and "parts of rainbows," occurring always in the right visual field. (4) Obesity was noted. In December, 1929, she had gained 50 pounds. (5) Tinnitus in June, 1930, began as rather constant roaring. (5) Pain, June, 1930, was felt in both ears and constantly. (6) Deafness began in June, 1930, in the right ear. It was intermittent. (7) A staggering gait was noted in July, 1930, with no latera'ization, and usually with some associated dizziness. (8) Hypertension was noted in August, 1930. The systolic pressure was 210. (9) Failing vision was noted in August, 1930, with transient attacks of blindness followed by hazy vision and better vision in the left eye than in the right.

Neurological Findings.—(1) Her weight is 230 pounds. (2) She is able to smell better on the right side than the left. (3) She has bi'ateral choked discs (4 diopters). (4) Right homonymous visual field defect (*Fig. 1*). (5) External rectus paresis on the left side. (6) Marked impairment of hearing on the right side.

Clinical diagnosis is temporoccipital tumor of the left side.

Operation was performed September 19, 1930, at the Piedmont Hospital. Ventriculography (Fincher) showed an intraventricular tumor filling the left lateral ventricle. With craniotomy (Dowman) through a postparietal transection of the cortex, the tumor was completely removed.

Postoperative Notes.—There was a complete hemiplegia immediately after operation, also a complete aphasia and complete homonymous hemianopsia. October 15, 1930, the patient was moving the right arm and leg and was able to carry on a conversation with some evident motor aphasia. December 19, 1930 (Fincher), a portion of the flap was sacrificed on account of an osteomyelitis. The hemiplegia and aphasia markedly improved. There was complete homonymous hemianopsia. June 23, 1933, the patient was readmitted to the hospital because of localized pain in the area of the remaining bone flap, which was removed (Fincher), with no subsequent pain. No neurological abnormality was noted except the right homonymous hemianopsia.

Pathological Notes.—The gross lesion was completely encapsulated and its only attachment was via a large blood vessel that became a part of the ventricular choroid plexus. Sections of the tissue were characteristic of a meningioma, showing fibrous tissue with architectural whorl formation.

The diagnosis was a fibroblastic meningioma.

The rarity of the location of this type of tumor, the accuracy of the preoperative diagnosis and the complete removal with the recovery of the patient would justify recording this case as a single case report.

"The impression gained from the neurological examination was that the patient had increased intracranial pressure due to a left cerebral tumor. The visual hallucinations and the relative right homonymous hemianopsia suggested the left temporoccipital region as the more likely location of the tumor."

*Read in Section on Neurology and Psychiatry, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

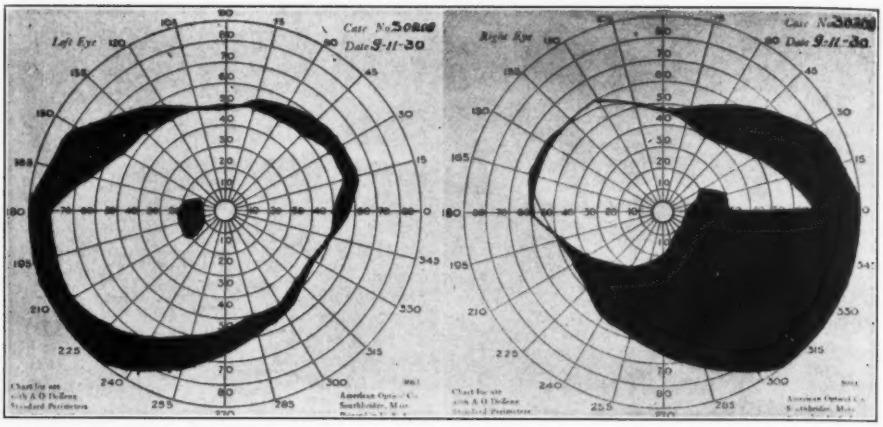


Fig. 1
Case 30209. Visual field studies prior to operation. After operation there was a complete homonymous hemianopsia which is still present.

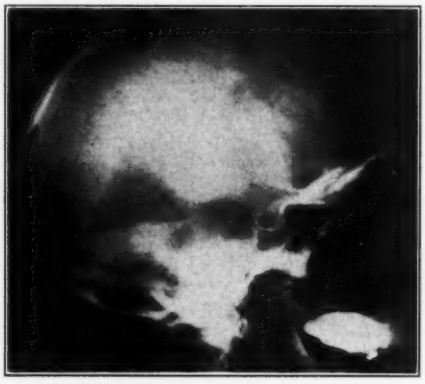


Fig. 2
Case 30209. Right side to plate showing the filling defect in the body and anterior horn of the left lateral ventricle.

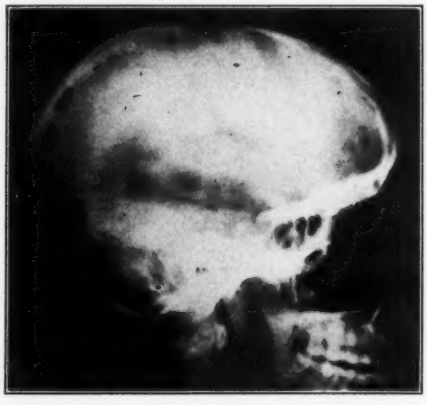


Fig. 3
Case 30209. Left side to plate showing air in the right lateral ventricle and a more definite outlining of the tumor defect in the left cavity.

Fig. 4
Case 30209. Photograph taken seven months after operation. The bulging on the left side of the head is the result of the sacrificed bone flap.

In order that a more definite localizing diagnosis might be possible a ventricular air study was made (*Figs. 2* and *3*).

In one or two of the cases here reported a clinical suspicion of an intraventricular lesion was aroused, but localization was possible only with ventricular air injections. Certainly too much cannot be said in praise of this most valuable contribution of Dandy's.[1] There were no upsetting reactions following ventriculography in any of the cases. In some instances craniotomy followed immediately after the air injection, but in the children the air was replaced by saline injection and craniotomy carried out at a later date. Not only for a localization of the lesion has ventriculography been invaluable,

but a definite idea of the surgical problem is to be gained. Summed up, one may safely say that without ventriculography our knowledge of intraventricular lesions would still depend in the main on autopsy studies.

Case 2 (30214).—Cyst blocking aqueduct of Sylvius. Evacuation of cyst (Dowman). Recovery.

September 15, 1930, a boy, aged 13 years, seen at the Steiner Clinic.

History.—(1) Headaches began in May, 1929, frontal in location and increasing in intensity. (2) Failing vision was noted in May, 1930, and photophobia. He was able to see better on the right side than on the left. (3) A staggering gait was observed in June, 1930, progressive, with a tendency to fall forward or to the right side, and usually an associated dizziness. (4) Sensory loss was observed in August, 1930. One attack involved the left hand and arm. (5) Vomiting occurred in September, 1930, not projectile and not associated with headaches.

Neurological Findings.—(1) There were bilateral choked discs (1 to 2 diopters); (2) sluggishness of the upward eye movements; (3) gross tremor of the outstretched fingers; (4) marked adiadokokinesia; (5) definite "cerebellar rebound" in both arms; (6) Rombergism to the right constantly; (7) marked "cerebellar ataxia;" (8) hyperactive deep reflexes on the right side; (9) right Babinski and Oppenheim; and (10) right ankle clonus.

The clinical diagnosis was posterior fossa tumor, probably midline.

X-ray of skull showed generalized convolutional atrophy with separation of the sutures.

Operation was done September 22, 1930, at the Steiner Clinic, a suboccipital craniotomy. No lesion was exposed. No ventricular fluid was seen. A retention cannula was left in the ventricle.

Operation was done October 15, 1930, and ventriculography (Fincher). I was unable to visualize the fourth ventricle by postural changes. Occipital bone flap, section of the tentorium, and posterior corpus callosum with evacuation of cyst were done.

Postoperative Notes.—There was a marked spasticity of all extremities immediately following operation, which was still evident at the time of dismissal from the hospital December 10, 1930. A wound slough at the margins of the cerebellar and occipital flap healed by secondary intention. By February, 1931, the patient was about and active.

Pathological Notes.—Elevation and retraction of the occipital lobe after section of the tentorium and corpus callosum made possible the exposure of this lesion. The gross specimen presented at a position beneath the posterior part of the corpus callosum and overlay the corpora quadrigemina. No tissue was removed for microscopic study, nor did the examination of the cystic fluid give any pathological clue, but its location was such that a pineal cyst seemed a likely diagnosis.

In this case a most valuable localizing finding was not given due recognition, namely: diminished conjugate eye movements upward. The enormously dilated third ventricle (*Fig. 5*) depicted on ventriculography would have prompted cerebellar exploration had the air injection been carried out preliminary to exploration.

Fig. 5

Case 30214. The enormous internal hydrocephalus simplified corpus callosum section.

With a negative cerebellar exploration, a failure on position change to visualize the fourth ventricle made it necessary that a tentorial section be carried out if the intracranial pressure was to be released. Nine of twelve pineal tumors studied by Horrax and Bailey[2] showed oculomotor involvement, a loss of conjugate eye movements upward being the most characteristic finding. In this case before operation a diminution in ability to raise the eyes above the horizontal plane was noted, but after cerebellar exploration the most evident neurological manifestation was the persistent downward eye gaze with a complete inability to raise the eyes upward. This loss of conjugate eye movements upward is infrequent in neurological examinations, but when present should be given due weight and corpora quadrigemina involvement brought to mind.

Case 3 (30258).—Adamantinoma of the third ventricle. Craniotomy, evacuation of cyst (Dowman), artificial interventricular foramen. Death thirty-two days later.

November 24, 1930, a woman, aged 29 years, was referred by Dr. E. S. Sledge, of Mobile, Alabama.

History.—(1) Headaches, beginning in 1924, occurred every one to six months, lasting twelve to twenty-four hours, frontal in location. They had been constant for the previous thirty days. (2) The menses in 1926 occurred every ten to fourteen days and were scanty for six to eight days. (3) Failing vision was noted in May, 1929, and blurred finer vision. (4) Mental changes noted in November, 1929, were forgetfulness, untidiness, indifference to domestic duties, irritability and restlessness, all of which were progressive. (5) Vomiting in October, 1920, was brought on by moving about or being jolted; it was not projectile. (6) Olfactory hallucinations occurred in November, 1930, disagreeable odors at times. (7) Dysphagia was reported in November, 1930, particularly for solid foods.

Neurological Findings.—(1) Bitemporal field defect was observed. (2) There were bilateral choked discs and enormous swelling, more in the right eye than in the left. (3) There was a lagging of the right side of the face on emotional movements. (4) There were coarse tremors of the outstretched fingers, more marked on the left side. (5) Perseverance of ideas. (6) Euphoria; and (7) hyperactive knee jerks.

Clinical diagnosis was left temporofrontal tumor.

Operation November 26, 1930, at the Piedmont Hospital consisted of left temporofrontal craniotomy and ventricular puncture. Cystic fluid was found. The cortex was transected, an intraventricular cyst was punctured, and an artificial interventricular foramen was made.

Postoperative Notes.—Immediately following operation the patient's temperature rose to 107° F. This was controlled by ice packs and colonic irrigations. This hyperpyrexia was a very common postoperative upset until her fourteenth day, when her temperature came down to normal and she was permitted out of bed. On December 23, 1930, her temperature fluctuations recurred and with each rise there was an associated excessive sweat and a persistent tremor of the left hand. On this date gentian violet injected into the lateral ventricle was not recovered from the cisterna magna. Decerebrate attacks were common and the patient became stuporous. Tapping the ventricles gave no relief of her downhill progress and she died on December 28, 1930, at which time her temperature had risen to 107° in spite of all hydrotherapeutic efforts.

Pathological Notes.—An autopsy was permitted. The surface of the brain presented no gross findings other than an abnormal tissue projection about 0.5 cm. in diameter just posterior to the optic chiasm. Upon sagittal section of the brain the artificial foramen constructed at the time of operation admitted the tip of the little finger. The third ventricle was completely filled with a cystic growth, the anterior wall of which had been destroyed. The posterior wall completely blocked the mouth of the aqueduct of Sylvius. Sections showed the epithelial type of cells occurring in indefinite bands in a pavement-like formation. The individual cells were squamous and low columnar in type. In other areas the cells were collected in groups and sectioned so that they appear as acinous structures.

The diagnosis was Rathke pouch cyst.

The history and findings in this case were those of a left temporofrontal lesion. The bitemporal visual field defect was the only finding that was not in keeping with the remainder of the clinical picture. The patient was so facetious and euphoric that her cooperation detracted somewhat from the possible accuracy of these field defects. The autopsy findings (*Fig. 6*) showed this surmise incorrect, for there was direct chiasmal pressure by the tumor.

Fig. 6

Case 30258. Showing the intraventricular opening (1) made at operation and the growth whose posterior wall was so adhered as to block the mouth of the Sylvian aqueduct.

A ventricular estimation rather than air studies was decided upon in this case because of clinical localization. On introducing the ventricular needle into the left temporal lobe, a resistance was encountered at a depth of some 4.5 cm. and when the stylet was withdrawn there was an escape of cystic fluid. A frontotemporal flap was then turned down, but it was only after the ventricular cavity had been reached by transecting the cortex that the lesion was uncovered. There was no communication with the opposite ventricle. A partial resection of the cyst was done before the extensiveness of the lesion was evident.

Case 4 (3235).—Papilloma of choroid plexus blocking foramen of Munro. Craniotomy (Fincher), transection of cortex, removal of cyst. Recovery.

March 10, 1932, a woman, aged 26 years, was referred by Dr. Marion A. Hubert, of Athens, Georgia.

History.—(1) Cessation of menstruation in 1927 was complete. (2) Headaches began in 1928, occurring every two weeks and lasting forty-eight hours, until 1930; they averaged one attack every three months until February, 1932, since which time they have been constant. (3) Vomiting began in 1927, usually accompanied by nausea and not projectile. (4) Pain in

both cheeks was noted in 1927, associated with headaches, but not with every attack of headache. (5) Obesity developed in 1928, when she gained seventy pounds in six months' time. (6) Personality change was noted in August, 1931, when she became euphoric, showed mental sluggishness, increased affection for her family, and was hysterical at times. (7) Mental changes were noted in February, 1932. She talked at random, with irrelevant conversation, showing perseverance of ideas, and was indifferent to sphincter control. (8) In March, 1932, she was drowsy.

Neurological Findings.—(1) Her temperature varied from 99 to 102° F. (2) She was stuporous and uncooperative. (3) Bilateral choked discs were observed, the left optic nerve head more swollen than the right. (4) Superficial reflexes were absent. (5) There were hyperactive tendon jerks; and (6) bilateral Hoffman, Oppenheim, Gordon and Babinski responses.

The clinical diagnosis was "Suprasella lesion filling the interpeduncular space, affecting the pyramidal tracts and probably invading the third ventricle."

Operation was done March 12, 1932, at the Steiner Clinic. Ventriculography gave no visualization of the third ventricle. First stage craniotomy and ventricular decompression were done. Second stage craniotomy followed March 15, 1932. Chiasmal exploration was negative. Postparietal cortical transection was done, with removal of a cystic tumor 1.5 cm. in diameter.

Postoperative Notes.—The immediate three days following operation the patient's recovery was a stormy one, with blood pressure changes, fluctuating respiratory phenomena, temperature elevations and a rapid pulse. Her treatment was purely symptomatic. There was a spastic left hemiplegia which began to clear up after the fourth day. The choked discs subsided within twelve days.

The patient was given a series of deep x-ray treatments and discharged from the hospital on April 4, 1932. She reported at the office on May 16, 1932, with no complaints and no neurological findings. She was given a second series of deep x-ray treatments in January, 1933, and when she was last seen on March 15, 1933 (one year after her operation) she was in excellent condition.

Pathological Notes.—The tissue removed was a portion of the choroid plexus and the small cystic mass was teased from out the lateral foramina, leaving a free communication with the cavity below. With this removal a gush of spinal fluid came through. Microscopic studies were those of choroid plexus, throughout which calcium plaques were quite numerous.

This patient was clinically a case of pituitary dysfunction which simulated that of the basophilic group. Her increased pressure findings disappeared by the end of her second postoperative week, although she continued to be extremely drowsy and slept an unusual amount. Any bruise to her body resulted in an exaggerated ecchymosis. The body strial changes, the hair growth, even in the absence of a high blood pressure, bony changes, or glycosuria brought to mind the possibilities of some basophilic overactivity and she was given a series of cross-fire x-ray over her sella turcica. She immediately improved from her stupor and before completion a definite improvement in her personality was noted. Because of a returning stupor and mental sluggishness she was given a second series of x-ray treatments, with a rapid disappearance of these symptoms.

It is assumed that the "pituitary picture" was secondary to the internal hydrocephalus. This is open to criticism, for the surgical specimen was not so large as to obliterate her mid-ventricle. However, her pressure findings disappeared rapidly without any attempts at decompression, for the dura was resutured and the bone flap replaced without any temporal sacrifice. Pituitary syndromes are not infrequent in third ventricle lesions and in this case this ventricle was not visualized with ventriculography and chiasmal exploration was negative.

Case 5 (32127).—Spongioblastoma of third ventricle. Ventriculography (Fincher), ventricular decompression. Death thirty-four days after hospital admission. Autopsy.

August 31, 1932, a little girl of 3 years was referred by Dr. Mercer Blanchard, of Columbus, Georgia.

History.—(1) Left hemiparesis was observed in 1930. When the patient was six months of age it was first noted that she did not use the left side as well as the right. This persisted and the child has always walked with a left limp and "has had little use of the left arm." (2) Fever was reported in August, 1932, (3) generalized headaches and (4) vomiting associated with the headaches and projectile in character. (5) There were decerebrate attacks, flexion of the left side, and extension of the right. (6) In August, 1932, when the paralyzed left side was moved the child shrieked with pain.

Neurological Findings.—(1) The child is acutely ill, apathetic looking and in poor condition generally. (2) There are mild hydrocephalus, (3) stiffness of the neck, (4) temperature 102.2° (R)., (5) bilateral choked discs, and (6) eye movements to the left, but never to the right side. (7) She moves the right extremities freely, but not the left. (8) She shows spasticity of the lower extremities, (9) hyperactive patellar reflexes, and (10) a bilateral Babinski.

The clinical diagnosis is tumor of the third ventricle.

Ventriculography was done September 2, 1932, at the Henrietta Egleston Hospital followed by ventricular decompression.

Hospital Course.—This was a prolonged pathetic sight, lasting over a period of five weeks. The patient had frequent attacks of momentary flexion of the entire left side with a simultaneous extension of the right extremities. The temperature chart was characteristic of a septic ailment, fluctuating from 99 to 104° almost daily. She complained of no headache as long as the ventricular drainage needle was in place, nor was there any vomiting. Since she failed to show any let-up in her general or neurological condition the cannula was removed on the ninth day. On the twenty-third day she developed pneumonia, a left otitis media, and she died on October 4, having been in a constant decerebrate rigidity for some forty-eight hours. Just prior to her death her temperature rose to 106° F.

Fig. 7

Case 32127. A constant conjugate head and eye position to the right was maintained by this child throughout her hospitalization.

Pathological Notes (*Fig. 7*).—An autopsy was permitted. There was no evidence of any inflammatory changes on gross inspection of the brain. On the undersurface of the brain, occupying an area anterior to the brain stem and replacing the mesial inferior surface of the temporal lobe, was a grayish-pink nodular tumor mass. This mass had so distorted the optic chiasm that the right posterior limb seemed to be a part of the tumor. The adjacent cranial nerves on this side were also distorted. The right cerebral peduncle was flattened and the opposite one stretched. Upon splitting the corpus callosum the tumor mass had completely filled the third ventricle and occupied a portion of the floor of the dilated left lateral ventricle. The tumor mass was strikingly demarcated from the brain stem. Sections made from the tumor showed it to be a spongioblastoma unipolare.

This was the only case studied that can be listed among the glioma group. With the exception of *Case 3*, all of the growths have been of a benign nature and it is their location rather than the character of the growth that makes them hazardous surgical problems. Dandy[3] has pointed out in a recent study (thirteen cases) the benign character of lateral ventricle growths. This was also true of his two cases of cysts of the fifth ventricle.[4] Zimmerman and German[5] reported two cases of third ventricle growths which were colloid tumors and tabulated twenty-eight similar cases found in the literature. Doyle and Kernohan[6] reported a ganglioneuroma of the third ventricle and found only eight other similar cases which justified this pathological diagnosis. Histologically one might expect ependymal and choroid plexus lesions to be in the majority, neither of which are of an infiltrating nature. Certainly with benign lesions in the majority every surgical effort possible should be carried out in the attempt completely to cure these patients.

Case 6 (31268).—Intraventricular lesion. First stage craniotomy (Fincher), radiation, disappearance of neurological symptoms for two years.

October 21, 1931, a boy, aged 12 years, was referred by Dr. Wm. A. Smith, of Atlanta.

History.—(1) Headaches were noted in 1927, recurrent, the interval between attacks lessening. The duration of attacks was about one week; they were frontal in location, with at times bradycardia (40 per minute) and at times Cheyne-Stokes respiration. (2) In the same year vomiting occurred, usually associated with attacks of headache, not projectile, and (3) dizziness was associated with the headaches. (4) There was unconsciousness in September, 1931, for one week, and (5) tonic contractions during unconsciousness, involving all four extremities, and (6) blurring vision with an associated diplopia. (7) Paresthesias were reported, sensation as "if worms were crawling along the knees and thighs on each side." (7) There were visual hallucinations of crowds of people.

Neurological Findings.—(1) Left upper homonymous quadranopsia was noted; (2) nystagmus on left lateral fixation; (3) the left pupil at times larger than the right; (4) lagging of the left side of the face on emotional movements; (5) superficial reflexes hypo-active on the left side; and (6) positive Rombergism to the left and backward.

The clinical diagnosis was possible temporofrontal lesion. Ventriculography was advised, but refused.

On October 11, 1931, the patient was readmitted to the Piedmont Hospital. The neurological findings were: (1) definite left facial weakness; (2) paresis of the left hand and arm; (3) choked discs (1 to 2 diopters), more marked in the right eye than in the left; and (4) absence of the left superficial reflexes.

The clinical diagnosis was "tumor of the right temporofrontal region."

Operation was done October 14, 1931, at the Piedmont Hospital. Ventricular estimation through the right frontal horn was 3 c. c. of clear fluid. A frontoparietotemporal bone flap was cut. No cortical lesion was found. A tap of the inferior and posterior horns was done. Fifteen to 20 c. c. of clear ventricular fluid were obtained on repeated tapping. Subtemporal decompression was done. All neurological symptoms disappeared.

Postoperative Notes.—Once over his operative shock his convalescence was uninterrupted. He was given a series of deep x-ray treatments and was discharged from the hospital on November 2, 1931. The patient was given a second series of x-ray treatments, and has been to the office at frequent intervals for neurological examination. None of his neurological symptoms have reappeared and his decompression remains soft. At times he reports that he has had an occasional headache with some bulging of his decompression.

After a failure to demonstrate a cortical lesion in the anterior and middle fossa, an exploratory cannula entered the ventricles within 3 cubic millimeters of the cortical surfaces. Ventricular fluid was obtained in large amounts from the anterior and inferior horns as well as the body of the right ventricle, which was convincing evidence that this was not a cerebral but an intraventricular lesion. The patient's condition did not permit cortical transection and the op-

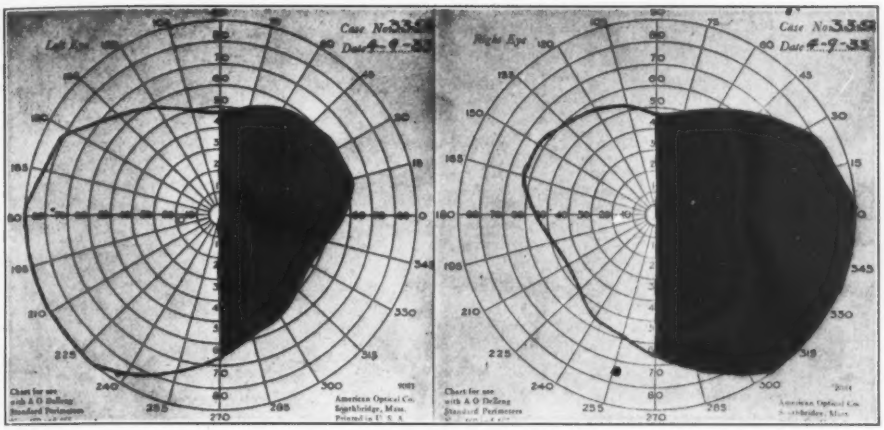


Fig. 8
Case 3352. Illustrating the complete homonymous visual field loss.

eration was completed with a subtemporal decompression and first stage craniotomy. Deep x-ray therapy was given with the idea of carrying out the second stage operation at a later date. Further x-ray has been administered and to date there has been no return of the neurological symptoms.

This case might well stand as a plea for two-stage procedures, but on the other hand *Case 8* represents the other consideration, for in that case the nature of the growth was such that radiation was valueless. Two-stage operations are necessary only where the patient's condition does not permit going further than cortical exposure; and radiation efforts are indicated on microscopic studies just as in tumors elsewhere in the brain. It is not always necessary to "uncap" the ventricle in removing these deep-seated growths, for an incision through the cortex is sometimes sufficient. In these cases section has been made through the postparietal region (*Cases 1* and *4*), the frontal region (*Cases 3, 7* and *8*) and corpus callosum (*Case 2*).

Case 7 (3352).—Left lateral ventricle meningioma. Complete removal (Fincher). Recovery.

April 8, 1933, a girl, aged 8½ years, was referred by Dr. Jas. W. Britton, of Anniston, Alabama.

History.—(1) In an automobile injury in 1929, she suffered a laceration of the left parietal region. (2) Headaches began in November, 1931, the periods lasting several hours, occurring first at monthly intervals, then weekly, and frontal in location. (3) Blindness came on with the headaches and was of a few minutes' duration. (4) Generalized twitchings began in April, 1932, more marked on the right side and never constant unless the patient was standing up. (5) Fever was noted in February, 1933.

Neurological Findings.—(1) There were complete right homonymous hemianopsia (*Fig. 8*); (2) bilateral papilledema (1 diopter); (3) right facial weakness (central); (4) marked coarse tremor of the right arm and leg; (5) right astereognosis; and (6) temperature of 100°.

The clinical diagnosis was temporoparietal lesion, probably deep in the temporal lobe adjacent to the ventricular wall.

Operation, April 12, 1933, at the Henrietta Egleston Hospital, consisted of craniotomy; no tumor was found, but a dilated ventricle on repeated tapping. April 19, 1933, ventriculography (*Figs. 9* and *10*) disclosed a tumor of the left lateral ventricle. April 24,

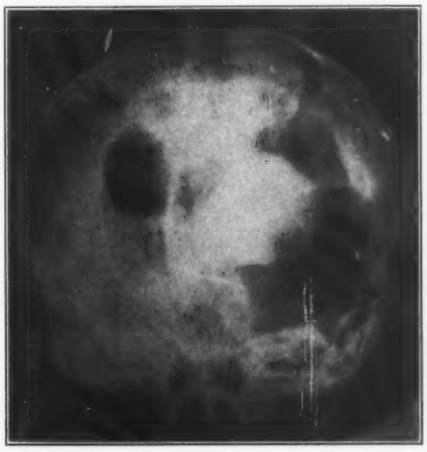


Fig. 9
Case 3352. The tumor clear cut in outline is clearly seen in the dilated left ventricle.

Fig. 10
Case 3352. Illustrates the anteroposterior extent of the lesion.

Fig. 11
Case 3352. This tumor weighed 60 grams.

1933, postparietal cortical transection and complete removal of the tumor (*Fig. 11*) were done.

Postoperative Notes.—Convalescence was a smooth one. Tremor persisted in the right arm, as did the visual field defect. On May 9, 1933, the patient was discharged from the hospital. She was seen on October 3, 1933, and had no positive neurological findings other than her visual field defect.

Pathological Notes.—The tumor was firmly adhered to the mesial wall of the left lateral ventricle. It was completely encapsulated, was nodular and grossly a meningioma. It received its blood supply from a very large artery that was continuous with the underlying

Fig. 12
Case 3352.

choroid plexus. Sections showed it to be a very cellular growth with numerous corpora amylacea. Characteristic numerous whorl formations were present. The diagnosis was fibroblastic meningioma.

In a series of eighty-five meningiomas reported by Cushing[7] in 1922 there were no such tumors in the first decade of life, nor were any located within the cerebral ventricles. Two of the lateral ventricle lesions removed by Dandy[8] were fibroblastic. In 1922, Lynn-Thomas[8] reported a calcified endothelioma successfully removed from the left lateral ventricle. Petit-Dutailles and Bertrand[9] reported a case, calling attention to the three cases cited by Alpers and Grant,[10] whose studies were on fibroblastic growths in the brain. Penfield, in discussing the case of Alpers and Grant, mentions a case arising from the choroid plexus.

In *Case 7*, although adhered to the mesial wall of the ventricle, there was a definite vascular connection with the choroid plexus. In *Case 1* the only attachment of the tumor was the vascular one which continued as part of the plexus vascular system.

Case 8 (33100).—Third ventricle cholesteatoma. First stage craniotomy (Fincher). Radiation, second stage craniotomy three months later, removal of tumor. Death.

June 26, 1933, a girl, aged 7 years, was referred by Dr. Richard B. Wilson, of Atlanta.

History.—(1) Headaches began in May, 1933, frontal in location, intermittent, occurring every two to three days and lasting from ten to fifteen minutes. (2) Vomiting was associated with the headaches and usually preceded by nausea. (3) Fever lasted for one week at the onset of the headaches and recurred throughout the illness. (4) Diplopia began in May, 1933, at onset associated with the headaches. (5) Drowsiness was noted in June, 1933. The patient was sleepy and drowsy

rather constantly and at times extremely irritable. (6) Paresthesias began in June, 1933, with transient attacks of numbness of the left arm and leg.

Neurological Findings.—(1) There was a right homonymous field defect on rough test (October, 1933). (2) Choked disc in the right eye was noted; (3) loss of convergence; (4) right sixth nerve weakness; (5) lagging of the right side of the face (central); and (6) a hypo-active left abdominal reflex.

The Clinical diagnosis was frontoparietal tumor on the right side.

Operation was done June 28, 1933, at the Georgia Baptist Hospital. Ventriculography showed a third ventricle tumor. First stage craniotomy was done. October 17, 1933, at the Piedmont Hospital, the second stage craniotomy was done, frontal cortical transection, and removal of the tumor. Death occurred sixteen hours later.

Postoperative Notes.—The patient's condition was never stable after she left the operating room. Her respiratory rate fluctuated from thirty to sixty per minute. Her systolic blood pressure varied from zero to 90 mm. of mercury. Her pulse rate continued about 120 per minute and with each fall in her blood pressure there was an increase in her pulse rate. Her temperature immediately after operation rose to 102°, then came down to 99°, with no further changes. She was able to take small amounts of fluid by mouth. Rather suddenly her respirations ceased. Stimulants, artificial respiration, and so forth, were futile and the heart beats ceased forty minutes after the respiratory collapse.

Pathological Notes.—After the frontal cortex on the right side was transected some 50 c. c. of fluid were removed from within the ventricle. The foramen of Munro was patent and a bulging bluish-green domed lesion filled the third ventricle and extended laterally to obliterate the midportion and inferior horn of the right lateral ventricle. When the capsule was ruptured a viscid cystic fluid escaped. Microscopically this fluid was filled with cholesterol crystals. The lesion was thoroughly encapsulated. The contents were removed by suction, the sac collapsed and with cotton pledgets and dissection the entire lesion was removed. Microscopic sections showed the growth to be a cholesteatoma.

The symptomatology in these cases has been variable and clinically misleading. More than one attempt has been made to ascribe a syndrome to third ventricle growths. In 1910, Weisenberg[11] studied thirty cases and felt that "growths within the third ventricle did not cause specific symptoms." Fulton and Bailey[12] grouped the symptoms of tumors in the region of the third ventricle under nine headings. Recently Allen and Lovell[13] concluded from a study of eight cases in the posterior portion of the third ventricle that there were no characteristic symptoms or localizing signs. This impression is also gained by a study of the numerous individual cases occurring in the literature. Among the eight cases in this report, generalized pressure findings were present in every instance. The variable ocular and visual field findings which were the next most common are nicely explained by Sheldon and Lillie:[14]

"The intimate relation of the optic tracts to the cerebral peduncles, to the walls of the third ventricle, to the ventricular system, to the temporal lobes, and to the basal ganglions furnishes abundant opportunity for a variety of symptoms and functional disturbances, depending on the site, rate, the direction and the degree of involvement of these structures by tumors."

Intermittent headaches with a tendency to increased frequency and severity have been the most constant complaint of the patients. Clinical localizing phenomena have been as variable as the visual field changes. Hemiparesis, incoordination, kinesthetic disturbances, functional upsets, hallucinations (olfactory and visual) and febrile upsets have all served to be misleading, and only through ventriculography has localization been possible.

REFERENCES

1. Dandy, W. E.: Ventriculography Following the Injection of Air Into the Cerebral Ventricles. Ann. Surg., **68**:5, July, 1918.
2. Horrax, G.; and Bailey, P.: Tumors of the Pineal Body. Arch. Neurol. & Psych., **13**:423, April, 1925.
3. Dandy, W. E.: Benign Encapsulated Tumors in the Lateral Ventricles of the Brain. Ann. Surg., **98**:841, Nov., 1933.
4. Dandy, W. E.: Congenital Cysts of the Fifth Ventricle. Arch. Neurol. & Psych., **25**:44, Jan., 1931.
5. Zimmerman, H. M.; and German, W. J.: Colloid Tumors of the Third Ventricle. Arch. Neurol. & Psych., **30**:309, Aug., 1933.
6. Doyle, J. B.; and Kernohan, J. W.: Ganglioneuroma of the Third Ventricle with Diabetes Insipidus and Hypopituitarism. Jour. Nerv. & Mental Dis., **73**:55, Jan., 1931.
7. Cushing, Harvey: Meningiomas: Their Source and Favored Seats of Origin. Brain, **45**:282, Oct., 1922.
8. Lynn-Thomas, John: A Case of Epilepsy of Twenty-Two Years' Standing Due to a Calcified Endothelioma of the Left Lateral Ventricle. Removal and Recovery. Brit. Jour. Surg., **9**:490, April, 1922.
9. Petit-Dutailles, D.; and Bertrand, I.: Fibroblastome Profond, Intracerebral de L'hemisphere Gauchesans Connexions Meningees Decalables. Ablation de la Tumeur. Guerison Operatoire. Rev. Neurol., **39**:96, July, 1932.
10. Alpers, B. J.; Grant, F. C.; and Yaskan, J. C.: Primary Fibroblastoma of the Brain. Arch. Neurol. & Psych., **27**: 270, Feb., 1932.
11. Weisenberg, T. H.: Tumors of the Third Ventricle, with the Establishment of a Symptom-Complex. Brain, **33**:236, 1910.
12. Fulton, J. F.; and Bailey, P.: A Contribution to the Study of Tumors in the Region of the Third Ventricle, etc. Jour. Nerv. & Mental Dis., **69**:1, 145, 261, 1929.
13. Allen, S. S.; and Lovell, H. W.: Tumors of the Third Ventricle. Arch. Neurol. & Psych., **28**:990, Nov., 1932.
14. Sheldon, W. P.; and Lillie, W. I.: Importance of Visual Fields as Aid in Localization. J.A.M.A., **94**:679, March, 1930.

DISCUSSION (*Abstract*)

Dr. J. G. Lyerly, Richmond, Va.—Tumors in the third ventricle frequently do not make their appearance known until they produce increase in the intracranial pressure by blocking the drainage from the lateral ventricles at the foramen of Monro. Sometimes they produce hypopituitary signs from pressure on the sella turcica. There may be signs of obesity or diabetes insipidus from involvement of the hypothalamus. There may be a certain amount of ataxia and unsteadiness of station and gait causing one to suspect a cerebellar lesion. A ventriculography is frequently necessary to localize the lesion accurately.

Some of these tumors are cystic, especially the type

called suprasella cyst usually found in childhood. Should the patient's general condition be bad the cyst may be tapped through a small opening in the frontal region which may give temporary relief and tide the patient over an emergency.

I recently had a patient who, when I first saw her, was unconscious with a temperature of 105° and decerebrate rigidity. Both lateral ventricles were tapped at the anterior horns and the suprasella cyst in the third ventricle was then aspirated. This gave the patient relief for several months. Recently I did an intracapsular enucleation of the suprasellar pharyngioma through an approach underneath the right frontal lobe. The growth was pressing on the optic chiasm and threatening to destroy her vision. Her vision was saved by this operation and she was relieved of her general pressure symptoms.

Ventricular punctures and aspiration of the cyst even in the third ventricle will sometimes tide the patient over an emergency. These are measures used by neurological surgeons in some cases to prepare the patient for operation.

Dr. W. Gayle Crutchfield, Richmond, Va.—I am impressed with the high percentage of intraventricular tumors in this series. In our experience they have not exceeded 2 per cent.

I should like to stress the difficulty with which intraventricular tumors are diagnosed. The patients usually present signs and symptoms of increased intracranial pressure without neurological evidence of localization. The diagnosis in almost every case is made by ventriculography. We have under observation at this time a patient from whom Dr. Coleman has just removed a cystic tumor of the third ventricle which was blocking the foramina of Monro. This patient was practically blind on admission to the hospital, as is frequently the case with intraventricular tumors. These tumors arise either from the ependyma or choroid plexus and are usually benign. It is reasonable to assume that if more attention were paid to the early examination of the fundi in patients complaining of visual disturbances, results from intraventricular surgery would be more gratifying.

AFTER-EFFECTS OF IRRITANT GASES: RESIDUAL PULMONARY LESIONS*

By Amos R. Koontz, A.M., M.D., F.A.C.S., Baltimore, Maryland

When poisonous gases were introduced into modern warfare during the late world conflict, nothing was known about the acute lesions produced by them, or what remote sequelae, if any, might be expected to result in those victims who recovered from the immediate effects of the gassing. The entire knowledge of the pathology of gassing was limited to those few cases that had occurred in the industries, and in these cases the gases concerned were not those used in warfare. Some of you here present will vividly remember how eagerly we crowded around the autopsy table in the first days of the A. E. F. to study the pathological lesions found in our first gas victims. While this was going on in France, Winternitz[1] and his coworkers at home were studying experimentally the acute lesions produced by the various war gases. Long before the end of the war the nature of these acute lesions was well known to everyone who took an interest in the subject.

Even during the War there was much speculation among both the laity and the medical profession as to the after-effects of gassing. Gassing had been pictured as the most horrible form of warfare. Undoubtedly one reason for painting the picture so black was the fact that the new and illegal method of warfare had been introduced by our enemies and not by ourselves. This also probably had something to do with the many dire prophecies as to what would happen to gas victims years afterwards. It was freely predicted that the lungs of gas victims would be permanently damaged, that soldiers who had been gassed would be more susceptible to pulmonary infections of all sorts, and that tuberculosis would be rampant among them. Later clinical experiences did not bear out these early dire predictions. A little more will be said on this subject later.

I was invited to present this paper before the Radiological Section because of some experimental work[2] I did on the remote effects of gassing at Edgewood Arsenal in 1921-24. As after every war, no sooner was the World War over than men began applying for pensions, both with reason and without reason. According to Gilchrist,[3] the total armed forces of the United States during the World War suffered casualties amounting to 8 per cent. The term "casualty" here includes all military losses caused by death, wounds, discharge from service, capture, or desertion. If those who died, were discharged from the service, captured, or deserted are subtracted from the total number of casualties it would leave only those who were wounded and who survived their wounds. These last are the ones who are usually considered properly pensionable, and this figure would, naturally, be a good deal less than the 8 per cent of total casualties. Yet by 1927 one-fourth of all of our men under arms during the World War, including Army, Navy and Marine Corps, both at

*Read in Section on Radiology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

*From the Medical Research Division, Chemical Warfare Service, Edgewood Arsenal, Edgewood, Maryland.

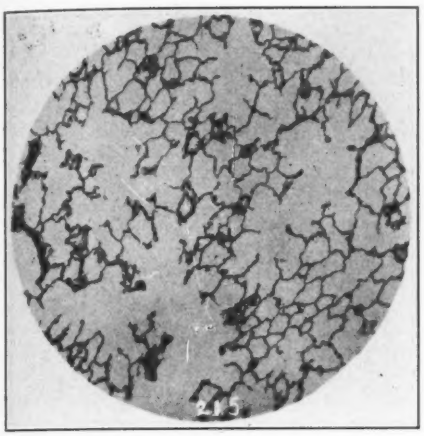


Fig. 1
Normal lungs in dog two weeks after recovery from phosgene.

home and abroad, had applied for compensation, and most of these applications were made soon after the war. There were living after the war approximately 200,000 men who had been wounded (including gas) during the war. Yet within a few years after the cessation of hostilities approximately a million had applied for compensation. In the case of a man wounded by one of the ordinary missiles of war the Veterans' Bureau had some tangible defect upon which to base their decision as to the man's compensation. In the case of a man wounded by gas, there was in most cases no such tangible basis for adjustment. Winternitz,[4] in 1919, had spoken briefly of the chronic lesions caused by gas, but nothing was known about the actual state, at the close of the war, of the lungs of a man who had been gassed, or of what their condition would be several years later. Most of these men were young and fairly healthy, and, therefore, autopsy records on them were not available. Many men applying for pensions as the result of gassing knew that it was difficult to prove whether they were actually suffering from remote effects of the gassing or not, and were willing to take advantage of the lack of knowledge of the subject. It was with a view to determining the nature of the pathological lesions, if any, remaining in lungs months or years after gassing that the above mentioned experiments were attempted.

I shall not attempt to give you the technical details or methods used in these experiments. These are given in the original article published in 1925.[2] Dogs were used in the experiments and they were gassed with the minimal lethal concentrations of various war gases. By minimal lethal concentration is meant the concentration at which the majority of the animals gassed died. At this concentration there is a minority which survive. It was the surviving minority that were kept for study afterwards. The gasses used were phosgene, mustard, lewisite, chlorine, chlorpicrin, and methyldichlorarsine. Of the number of dogs gassed 313 survived and were autopsied at intervals of time varying from the time of recovery to a period 15 months after recovery. Dogs were considered to be recovered when their temperature, pulse and respiration had become normal, and after all symptoms, such as coughing, depression, and general lack of well-being, had disappeared. None of the animals was given any treatment whatsoever after gassing.

The following summary of results may be quoted from my original article:

"The dogs that were killed at varying intervals after recovery may be divided into three groups as follows: (1) those in which the lungs were normal; (2) those which had more or less acute pulmonary lesions, and (3) those which showed chronic lesions. Normal lungs were found in a few dogs that were killed at the time of recovery, and the percentage of normal lungs gradually increased from this time to the end of the period of observation (fifteen months from date of recovery). However, the percentage of normal lungs in the first five to eight weeks after recovery was not very large, while after this period normal lungs were in the large majority. The more or less acute lesions that occurred in the first five to eight weeks after recovery

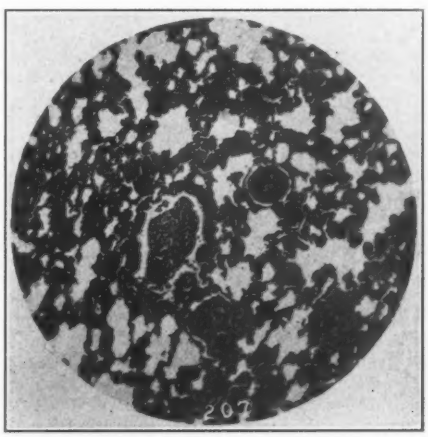


Fig. 2
Chronic obliterative bronchiolitis in dog that died eight months after apparent recovery from phosgene.

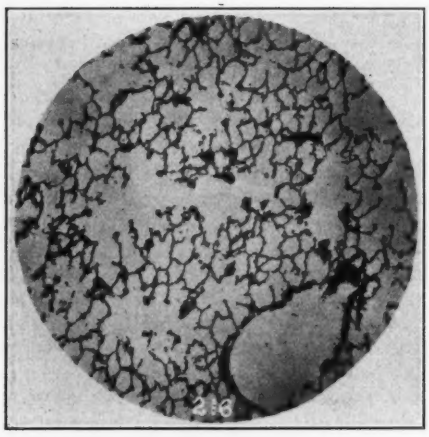


Fig. 3

Normal lungs in dog killed at time of recovery after being sick for four weeks from mustard.

consisted principally of edema, desquamation of alveolar epithelium, plugging of bronchi with debris, atelectasis, occasional patches of chronic inflammatory reaction and an occasional pneumonia. The chronic lesions occurred between the period from five to eight weeks after the date of recovery and the end of the period of observation, and consisted principally of small patches of organization, often associated with minute hemorrhages, chronic bronchitis and peribronchitis and organizing obliterative bronchiolitis.

"It should be made clear that the pathologic lesions encountered in the group of dogs that were sacrificed at various intervals of time after recovery were limited in extent and discovered only microscopically. In practically all of these dogs the lungs appeared normal in the gross."

The following conclusions were drawn from the experiments:

"(1) In the great majority of dogs gassed at lethal concentrations, no pathologic lesions can be demonstrated from two months to a year after recovery.

"(2) In a minority of instances, permanent lung damage is done; but this damage is not widespread, is generally confined to small areas, and is generally in the form of small patches of organization, thickening of the bronchial walls with loss of elasticity, or occasional closing of the bronchioles by organized exudate.

"(3) All such damage will ultimately result in fibrous tissue. This small amount of scar tissue can hardly affect the functional efficiency of the lungs.

"(4) Since the lungs of dogs are more delicate than those of human beings, it is reasonable to conclude that in the vast majority of surviving human patients, who were not gassed so severely and who receive infinitely better care in hospital, all lesions have disappeared within a short while after gassing, and that the small amount of fibrosis remaining in the minority of cases can hardly be a cause of serious disability."

I think it only fair to stress the point made in the fourth conclusion, namely, the difference between the conditions under which these experiments were made and the conditions surrounding soldiers gassed in war. The dogs gassed in the experiments were gassed with concentrations of gas that are fatal in the majority of instances, and they received no care in hospital or treatment of any sort following the gassing. Most men gassed during the war were gassed with much lower concentrations, and received the best of care in hospitals following the gassing. This would lead us to believe that the sequelae in gassed ex-soldiers would be of less consequence than those found in the experiments. Unquestionably, also, a number of the dogs considered recovered from the effects of the gas, and autopsied as recovered dogs, would not have been considered recovered by the ordinary clinical methods. All of us who saw these cases in France during the war know that often after temperature, pulse and respiration had become normal, and all symptoms had disappeared, there could still be found rales or other signs in the chest. If the dogs in the experiments could have had the physical signs in their chests studied, undoubtedly the date of recovery would have been delayed in some of them, and the pathological lesions in supposedly recovered lungs would thereby have been decreased in number. Furthermore, the picture was undoubtedly complicated somewhat by the presence of distemper. Likewise, in studying the after effects of gassing in ex-soldiers, it should be borne in mind that a chronic bronchitis existing before gassing is

Fig. 4

Hypertrophied bronchial epithelium and dilated mucous glands in wall of bronchus of dog killed six weeks after recovery from mustard.

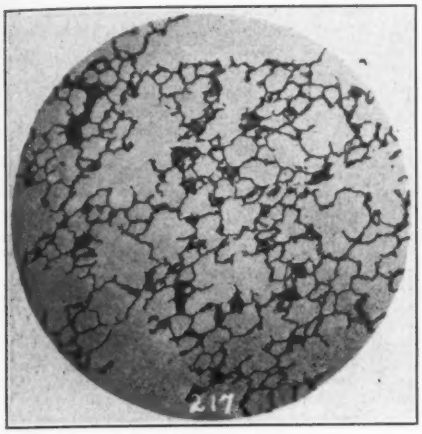


Fig. 5
Normal lungs of dog killed five weeks after recovery from lewisite.

often a complicating factor. Also, Winternitz[5] has pointed out the similarity between many of the respiratory lesions of influenza and those initiated by the inhalation of poisonous gases.

It is regrettable that facilities were not available for studying the lungs of the experimental animals with the x-ray. The study would have been much more valuable from a clinical point of view if we had been able to compare the x-ray picture with the pathological findings. Also we had hoped to study the pathological physiology as well as the pathological anatomy of these animals, but were prevented from doing so by our inability to measure the working capacity of dogs by means of the tread mill or other device.

There have been a number of clinical studies on the after-effects of gassing published since the War. I shall make no attempt to review these, but simply call your attention to one or two of them. Berghoff,[6] in 1919, reviewed 2,000 cases of gassed soldiers, about four months after gassing, that came before the Fort Grant Board, a board appointed to examine soldiers claiming disability from the effects of warfare gas. He found that they fell into three groups: (1) a normal group, almost 50 per cent of the total; (2) a bronchitic group, about 30 per cent of all cases examined; and (3) an emphysema group, about 22 per cent of the 2,000 cases. He drew the following conclusions from his study of the 2,000 cases:

"(1) That gas victims, irrespective of the type of gas and severity of attack sustained, show no marked predisposition toward active pulmonary tuberculosis, or toward the reactivation of a healed or quiescent pulmonary lesion.

"(2) That gas victims present litt'e evidence of material destruction of lung tissue.

"(3) That gas victims with emphysema findings have a more protracted convalescence than have those of the bronchitic group."

Recently Gilchrist and Matz[7 8 9 10] have made exhaustive studies of the cases (a total of 486) who received hospitalization for a protracted period of time. The men studied had been gassed with phosgene, mustard, chlorine and the arsenical compounds. The number they found having residua of gassing would make only a very small fraction of 1 per cent of the total number gassed.

A word also might be said as to the relation between gassing and the subsequent development of tuberculosis. The literature on this subject has been reviewed in one of the author's previous publications.[11] A good deal has been written on the subject, and the opinion is practically unanimous that gassing does not predispose to tuberculosis. Gilchrist[12] quotes the following from the report of the Surgeon-General of the Army for 1920:

"The number of cases of tuberculosis for each 1,000 men gassed was 2.45. Since the annual rate of occurrence for tuberculosis among enlisted men serving in Europe in 1918 was 3.50, and in 1919, 4.30 per 1,000, it would seem to be apparent that tuberculosis did not occur any more frequently among the soldiers who had been gassed than among those who had not been."

In addition to the large mass of clinical data, I have published the results of two experimental

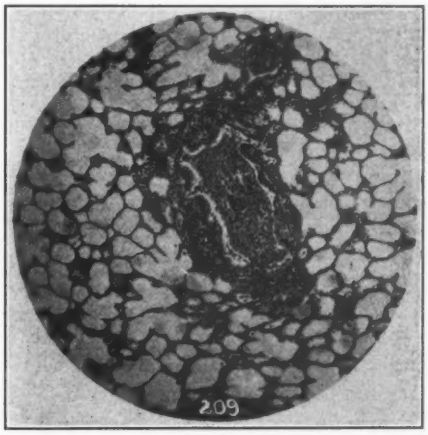


Fig. 6
Organizing obliterative bronchiolitis in dog that died ten weeks after recovery from lewisite.

studies[11 13] on the relation between gassing and tuberculosis. Phosgene, mustard, and lewisite were the gases studied. A number of rabbits were inoculated with tubercle bacilli, half of them gassed, and the other half kept as controls. The number of rabbits developing tuberculosis was larger in the control group than in the gassed animals. This is in accord with the known clinical fact that tuberculosis is rare in persons who have mitral stenosis. Apparently congestion of the lungs is a condition unfavorable to the growth of the tubercle bacillus.

It will thus be seen that the early predictions as to the late dire results of gassing were overestimated by both the laity and the profession, just as the horrible effects of gassing on the whole were unduly stressed. It might be interesting to give some figures comparing the havoc produced by gas and other war weapons. The figures to be quoted are again taken from Gilchrist.[14] Of the total number of men gassed during the war, 2 per cent died. Of those wounded by bullets, shell, and all other methods of warfare except gas, 24.8 per cent died. Of the total number of men blinded in one or both eyes from war weapons, gas was responsible for only 3.8 per cent. War weapons were responsible for 9,147 permanently crippled soldiers. Gas was responsible for none of these.

According to Gilchrist,[3]

"the number receiving disability pensions in 1920, two or more years after gassing, was approximately 19,000; that is, about 12 per cent of the total gas casualties. Gas poisoning was responsible actually for 2 per cent of all the disabilities after the war, 35 per cent of all pensioners being classified as suffering from wounds and injuries and 65 per cent as suffering from diseases."

CONCLUSIONS

(1) In cases recovering from severe gassing with the usual war gases most lungs return to normal.

(2) Of the small number which do not return to normal in practically all cases only inconsequential lesions remain.

(3) Only in exceptional instances does permanent disability result.

REFERENCES

1. Winternitz, M. C.: Pathology of War Gas Poisoning. Yale University Press, New Haven, 1920.
2. Koontz, A. R.: When Do Lungs Return to Normal Following Exposure to War Gases? Arch. Int. Med., **36**:204-219, 1925.
3. Gilchrist, H. L.: A Comparative Study of World War Casualties from Gas and Other Weapons. United States Government Printing Office, Washington, D. C., 1928.
4. Winternitz, M. C.: Chronic Lesions of the Respiratory Tract Initiated by the Inhalation of Irritating Gases. J.A.M.A., **73**:689-691, 1919.
5. Winternitz, M. C.; Wason, I. M.; and McNamara, F. P.: The Pathology of Influenza. Yale University Press, New Haven, 1920.
6. Berghoff, R. S.: The More Common Gases: Their Effect on the Respiratory Tract; Observation of 2,000 Cases. Arch. Int. Med., **24**:678-684, 1919.
7. Gilchrist, H. L.; and Matz, P. B.: The Residual Effects of Warfare Gases: The Use of Chlorine Gas, with Report of Cases. Med. Bull. of the Veterans' Administration, **9**: 229-270, Jan., 1933.
8. Gilchrist, H. L.; and Matz, P. B.: The Residual Effects of Warfare Gases: The Use of Mustard Gas, with Report of Cases. Med. Bull. of the Veterans' Administration, **9**:339-390, April, 1933.
9. Gilchrist, H. L.; and Matz, P. B.: The Residual Effects of Warfare Gases: The Use of Phosgene Gas, with Report of Cases. Med. Bull. Veterans' Administration, **10**:1-36, July, 1933.
10. Gilchrist, H. L.; and Matz, P. B.: The Residual Effects of Warfare Gases: The Use of Arsenical Compounds, with Report of Cases. Med. Bull. of the Veterans' Administration, **10**:79-98, Oct., 1933.
11. Koontz, A. R.: War Gases and Tuberculosis: An Experimental Study. Arch. Int. Med., **39**:833-864, June, 1927.
12. Gilchrist, H. L.: Report on the After-Effects of Warfare Gases. Chemical Warfare Service, U.S.A., 1922.
13. Koontz, A. R.: Mustard Gas and Tuberculosis: An Experimental Study. Arch. Int. Med., **43**:90-95, Jan., 1929.
14. Gilchrist, H. L.: The Humanity of Chemical Warfare. Military Surgeon, **57**:529-538, Nov., 1925.

DISCUSSION (*Abstract*)

Dr. Claude Moore, Washington, D. C.—Dr. Koontz's paper is certainly in accord with the opinion and conclusions of the more conservative men acquainted with the effects of irritant gases used during the World War. In 1921 and 1922 I had the opportunity to examine, for the Veterans' Bureau, a large number of ex-service men complaining of the residual after-effects of "being gassed" in France. I almost universally found their chests to be normal. In many cases where I believed the man was not a malingerer, I had roentgenograms made of his chest and sometimes called a chest specialist in consultation. It was the very rare exception for any of us to find anything abnormal in the lungs whatsoever, and we usually came to the conclusion that the patient was a malingerer or else a psychoneurotic. Like the examination of most such cases, the economic factors entered largely into the complaints. I think I recall that the total number of ex-service men applying for compensation in the entire United States because of "being gassed" in France was greater than all our total casualties from all causes during the World War. A large percentage of these "gassed" cases were circulatory asthenias or other mental disturbances. The examination of these men was further complicated by friends and family physicians who gave opinions rather than actual chest findings extending back over the period since the War. Because of prejudice created by these cases many deserving men throughout the country who were entitled to compensation did not receive due consideration.

Dr. L. Freeland Magruder, Norfolk, Va.—I had occasion to make x-ray studies of a large number of these cases at Base Hospital 41 in Paris a few weeks after the inhalation of gases. During the years 1919 and 1920 I saw many like cases in private practice, and as consultant in roentgenology to the United States Public Health Service. I have never been able to classify any lesions as pathognomonic. It is my opinion that a like large group of men within the same age limits who have not been gassed would show as

large a percentage of departures from normal as the group which had been gassed.

Dr. Koontz (closing).—Undoubtedly, both experimentally and clinically, the picture in the gassed lung is very frequently complicated by other things, distemper in the dog, influenza and many other conditions in the human. It is quite probable that very seldom do we have a perfectly normal lung to start with, either experimentally or clinically. The sum total of the matter is that we should probably hear very little about gassing now were it not for the question of pensions.

RADIUM TREATMENT OF EPITHELIOMA OF THE EYELID*

By HOWARD HAILEY, M.D.,†
Atlanta, Georgia

Early diagnosis and proper treatment of epithelioma of the eyelid is a responsibility which the dermatologist should recognize and prepare himself to meet. Because of his familiarity with skin affections he is able to make an early correct diagnosis. An early diagnosis is essential for the best cosmetic result, which is of great importance to the patient.

The most common clinical types of epitheliomata of the eyelid are: cystic, nodular, ulceronodular, ulcerating, invading and fungating. They are practically always of the basal cell type. I will show a slide of a biopsy-proven case of the squamous cell type. Biopsy is seldom necessary. Lesions which may be and are confused with epitheliomata are: keratoses, chancre, pyogenic granuloma, infected verrucae, moles, lymphangioma, molluscum contagiosum, blastomycosis, lupus erythematosus and lupus vulgaris.

Epitheliomata of the eyelid, as elsewhere on the body, vary widely in their rate of growth. I recall a patient, five years ago, who had a lesion at the inner canthus and because of fear of "damage to the eye" declined treatment. This patient returned to my office recently for another condition. While the lesion was easily recognized, it was not more than one-half the size that it was when first observed. He had not received any treatment. In 1926, I reported a case in which an epithelioma disappeared spontaneously. I believe cystic degeneration accounts for such occurrences. These observations are uncommon and are not intended to encourage delay in treatment. The sight of a neglected case with its subsequent disfigurement is a reminder of what untreated epithelioma can do.

Unfortunately, the unwarranted prevalent fear of "damage to the eye" from radiation has been responsible for many patients' seeking and receiving more dangerous treatment, such as chemical caustic pastes. A review of the literature does not disclose that radiation in curative doses for epithelioma of the eyelid is responsible for permanent damage to the structures of the eye. Frequently the coincident development of cataract or a pre-existing cataract has been unfairly charged to the effects of radiation. A discussion of the justified damage to the eye in radiating more serious lesions than epitheliomata of the eyelid is not in the scope of this paper. A moderate conjunctivitis, which disappeared readily, has occurred in a few of my cases. Conjunctivitis occurred only in those cases where the lesion was at the lid margin or where the lesion was rather large and required more radiation than usual.

Generally speaking, radium is the best treatment for epithelioma of the eyelid. Lesions in or near the center of the lid can be treated successfully with x-rays. The treatment of lesions at the margin of the lid and those involving the canthi elicit the advantages of radium. Radium offers a greater margin of safety and facilitates concentration of the treatment at the diseased area. In addition, radium treatment is followed by a soft, pliable, non-contractile scar which is essential to the future function of the eyelid. Surgery and chemical caustics do not offer this assurance and are accompanied by the possibility of infection. If ectropion is present, due to infection or previous caustic treatment, radium will improve, if not completely correct, this disfigurement.

TECHNIC OF TREATMENT

I have dispensed with the use of the eye globe shield for protection of the eye. If the epithelioma to be treated is distal to the lid margin, the lids are closed and fixed with adhesive. A lead foil window screen is applied. If the lesion involves the lid margin the affected lid is drawn over the edge of the normal lid and made secure with adhesive. Sometimes it is advantageous to evert the affected lid by means of a wide strip of adhesive and then the normal lid is closed and

---

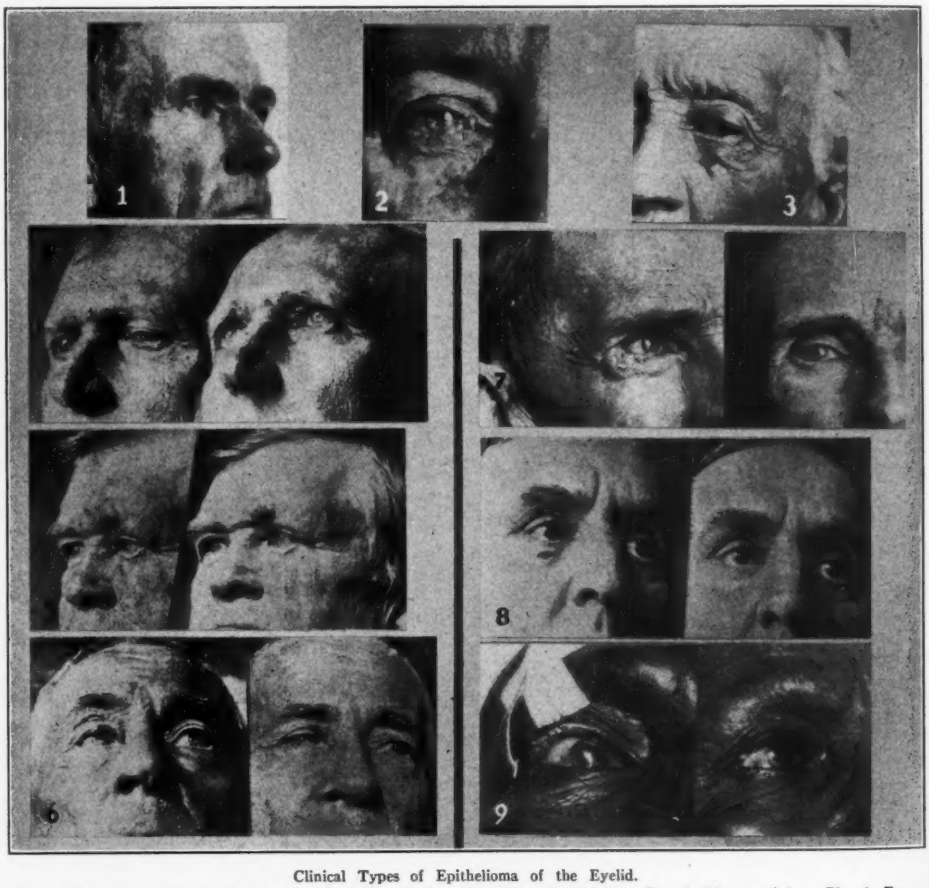
*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

†Associate Clinical Professor of Dermatology, Emory University School of Medicine; Dermatologist, Grady Memorial Hospital (White Unit), Georgia Baptist Hospital, Crawford W. Long Hospital, and Egleston Memorial Hospital for Children.

fixed with adhesive. The window screen is then applied. A half or full strength radium plaque is applied for the estimated number of hours. Often it is advisable to divide the total dosage into several treatments. By doing this immediate mechanical conjunctivitis and subsequent radiation conjunctivitis are minimized.

The dosage in milligram hours depends on many factors. Very early lesions can be destroyed by 20 milligram hours, while larger lesions require 100 milligram hours or more. The amount of filtration influences greatly the dosage in milligram hours. Only a small percentage of *beta* rays are filtered out in the average case. Fifty per cent or more of the *beta* rays should be filtered out when treating marginal and invading lesions of the canthi. The deeper nodular and ulcerated lesions require filtration, while the fungating lesion acts as an admirable filter.

Some nodular lesions are more suitable for buried radiation than surface application of plaques. In this type of lesion I use iridium-platinum needles containing 5 milligrams of radium element. Under novocaine a tract is made for the radium needle with a Hagedorn needle. Using special forceps the radium needles are inserted and allowed to remain in place from four to eight hours. When more than one needle is necessary they are placed six to eight millimeters apart. Ulcerated epitheliomata with a crater of a depth of 5 millimeters are conveniently treated by placing needles at the base of the ulcer, then applying a plaque on the surface.



Clinical Types of Epithelioma of the Eyelid.

Fig. 1, Ulcerating. Fig. 2, Nodular (cystic). Fig. 3, Invading. Fig. 4, Nodular. Fig. 5, Ulcero-nodular. Fig. 6, Fungating. Fig. 7, Ulcero-nodular. Fig. 8, Ulcerating (invading). Fig. 9, Squamous (biopsy-proven).

In this way the advantage of crossfiring is obtained.

Since many factors govern a lethal dose of radium for cancer cells, generally speaking, rigid rules as to dosage cannot be followed.

Some physicians and many laymen advise patients with early epithelioma of the eyelid to "leave it alone." Such advice is most unfortunate for the patient. Let us hope that it will not be long before the disfigured and sometimes incurable patient with cancer of the eyelid and neighboring structures will be found only among the pictures in text-books.

803-4 Candler Building

DISCUSSION (*Abstract*)

Dr. L. W. Ketron, Baltimore, Md.—Dr. Hailey believes that radium is the most satisfactory agent for treating malignant diseases of the eyelid. I have always evaded the use of radium around the eye when the globe is in the direct line of fire, except in cases where preservation of this organ is of minor importance. Although there is a great deal of conflicting literature on the subject, it has seemed to me that damage to the cornea, bulbar conjunctivae or perhaps the deeper structures might quite well follow two or three erythema doses of radium applied to the lid, especially if there were not enough intervening tumor tissue to absorb most of the rays.

Desjardins, who has recently reviewed this subject, states that the conjunctivae and lids are more sensitive and that the cornea is less sensitive than the surrounding normal skin. He states also that lenticular changes in the eyes of adult animals can only be produced by doses several times greater than that of the normal skin erythema dose.

Clapp has also recently reviewed the subject and has collected 34 cases from the literature in which lenticular changes followed radiation about the eye for various therapeutic purposes. He quotes the experiments of Peters, who was able to produce changes in the lenses of rabbits with doses as small as 160 mgh. filtered through 0.5 mm. of platinum-iridium. Clapp concludes that there is certainly an element of danger associated with the use of both x-rays and radium in this location.

It is not my wish to condemn the use of this valuable agent for treating epitheliomas of the eyelid, but I feel that the possibilities of injury should be brought up in any general discussion of the subject.

Dr. Chas. O. King, Birmingham, Ala.—The treatment of epithelioma of the eyelids depends upon complete destruction of the lesion, whether it be by caustic paste, trichloracetic acid, electro desiccation, surgery, x-ray or radium. Like Dr. Ketron, I am not so enthusiastic as Dr. Hailey regarding radium treatment. Perhaps it is because I have not used it so extensively as he does. My routine is to desiccate the lesion beyond the line of ulceration, and then to use x-ray. The dosage is regulated by the depth, duration and amount of fibrous tissue found. We know that the eye will tolerate large doses of x-ray yet I feel that it is safer to use a metal eye globe, fasten the lids with adhesive, and screen the lesion before treating. It is important to observe these lesions monthly. Frequently we can catch a beginning recurrence around the border.

Dr. M. T. Van Studdiford, New Orleans, La.—In treating epithelioma of the eyelids with radium, one must be careful to protect the eye. We know that the radiation tolerance of the sclera is high, but I have seen patients who have had injury to the lens capsule and injury to the retina from prolonged irradiation. I suggest that the eye be protected with a concave lead shield very much the shape of a spoon. The lead does not touch the eye and the polished surface of the convex does not irritate the mucosa of the lid to an appreciable degree. In many patients the lower lid can be drawn down with adhesive strips far enough to free the eye from the field.

Dr. H. M. Robinson, Baltimore, Md.—There can be no question that caution should rule any roentgen or radium treatment in the neighborhood of the cornea. Nevertheless, with the proper screening and care, x-ray and radium in this region have not brought about harmful effects in my experience. When one considers that these therapeutic agents are used to disperse the opaque deposits in interstitial keratitis, with good results and rarely with ill effects, I am sure we are over-accentuating their possibilities for harm.

VISUALIZATION OF THE LIVER AND SPLEEN AS A DIAGNOSTIC AID IN ABDOMINAL CONDITIONS*

By JOSEPH E. HIRSH, M.D.,
and
B. F. MORTON, M.D.,
Birmingham, Alabama

For many years attempts have been made to devise a method whereby a more accurate diagnosis of diseases of the liver and spleen might be made. In 1927, Einhorn and Stewart[1] first conceived the idea of visualizing these organs by means of the oral administration of diiodoatophan and sodium tetra-iodophenolphthalein. Two years later, Radt,[2] of Berlin, described visualization of the liver and spleen by the intravenous injection of a thorium compound, and it is to him that most credit is due for the development of hepatosplenography.

During the past eighteen months, we have had occasion to utilize this diagnostic procedure in thirty patients at the Hillman Hospital with most gratifying results (*Chart 1*).

SOLUTION

The solution injected was thorotrast,[3] a stabilized thorium dioxide solution containing 25

*Read in Section on Gastroenterology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

Chart 1

Roentgenological Diagnosis	Number of Cases	Cases Proved by Operation, Biopsy or Laboratory	Cases Proved by Autopsy
Metastatic carcinoma of liver	9	5	4
Cholelithiasis	2	2	0
Hemolytic Jaundice	1	1	0
Banti's disease	1	0	1
Atrophic cirrhosis	3	0	1
Passive congestion	4	0	3
Myelogenous leukemia	3	3	0
Gaucher's disease	2	2	1
Tuberculous peritonitis	1	1	0
Catarrhal jaundice	2	0	0
Sickle cell anemia	1	1	0
Benign hepatic tumor	1	0	1

per cent thorium dioxide by volume (19 to 20 per cent by weight) and about the same amount of protective colloid, with 0.15 per cent of methyl p-hydroxybenzoate as a preservative.[4] It is said to be miscible with all body fluids without being flocculated or otherwise affected, very stable, transparent, colorless, non-poisonous and non-absorbable.

METHOD OF ADMINISTRATION

One c. c. of thorotrast per kilogram of body weight was given intravenously every other day in sixteen cases and every day in fourteen cases until three injections had been given the patient. This corresponded to about 25 c. c. of the solution for each injection. The solution was first warmed to body temperature and the injections given very slowly, eight to ten minutes being required for each.

Forty-eight hours after the last injection a roentgenogram was made of the liver and spleen. This can be done as early as twenty-four hours after the last injection, or, if an emergency demands, only a lapse of four hours is required, as pointed out by Yater and Otell.[5]

The technic suggested by Tripoli and Haam[6] was followed in a slightly modified form. The usual evening meal was served the night before the examination, and at bed-time a brisk purgative was given. The following morning the patient received a cleansing enema and then was sent to the x-ray department, without breakfast. A plain anteroposterior roentgenogram was taken at a distance of 55 cm. with a Potter-Bucky diaphragm, using a potential of 50 kilovolts (4¾ in. spark gap) 30 milliamperes, time 4 to 5 seconds (at 26-inch distance).

The degree of opacity of the liver and spleen depends, on the one hand, on the quantity of injected thorotrast, and on the other, on the functional condition of these organs. In interpreting the pictures, great care must be exercised in order that gas in the intestines be not mistaken for intrahepatic negative shadows.

REACTION

Reactions following the injections are extremely rare. Yater and Otell,[7] in reporting forty cases, obtained reactions in only three, these being pain in the lumbar region in two cases, and puffiness of the face and eyes in a third. Udaondo[8] noted headache, slight fainting spells and hyperpyrexia in one case; Kdrnka[9] found vomiting in three of his twenty-five patients, and a slight hemoclastic shock in a fourth; except for a mild elevation of temperature of one individual after the first injection, McDonald[10] experienced no reaction in eighteen patients. Warfield[11] reported no reaction in his series of patients; the same was true of Lewisohn[12] in six cases and Dickson[13] in eighteen cases. Erickson and Rigler[14] observed eighty-two patients in which there was a reaction, hematuria and hematemesis, in only one. Radt[2] called attention to a slight elevation of temperature following injections in patients previously toxic or cachectic. Aside from this, he found no untoward results after three and a half

Fig. 1

A normal liver and spleen of a patient to whom thorium dioxide had been given. This patient had a carcinoma of the colon and the liver is seen to be uninvolved.

Fig. 2
Visualization of the liver and spleen in a patient with hemolytic anemia.

years' observation in animals and two years' observation in the human.

On the other hand, Stewart, Einhorn and Illick,[15] in a series of only eight cases, reported vomiting attacks in three and hemorrhage in two, while Büngeler and Krautweig[16] recorded a fatal rupture of an enlarged spleen twenty-two hours after the second injection of thorotrast. In our work, which included thirty patients and twenty-one rabbits, we made a total of 132 injections, and in not one instance was there the slightest reaction of any kind.

DISTRIBUTION

The colloidal particles of thorium dioxide, which are opaque to x-rays, are carried through the venous sinuses of the liver and spleen and are phagocyted by the reticulo-endothelial cells. In addition to these two organs, the bone marrow and lymph nodes receive relatively the same amount of thorium, while smaller amounts are found in the ovaries and suprarenals. Occasionally, according to Dickson,[13] the kidney will show a slight deposit in the intracellular spaces, but only if pre-existing disease is present. Dickson further pointed out that the lungs, if sectioned a few days after the injection, show no thorium, but that after a time the large thorium-laden cells of the liver are picked up by the blood stream and carried to the lung. The thorium is then found in this organ. Our own results in eight autopsied cases confirmed this. Bauman and Schilling[17] injected thorotrast into the veins of rabbits, and fifteen minutes later observed shining, unstained particles in the Kupfer cells of the liver and in the reticulo-endothelial cells of the splenic pulp. Twenty-four hours later, these same cells were loaded with large shining silvery particles, which were still present fourteen days later.

Erickson and Rigler,[13] in postmortem examination of twelve cases, detected thorium dioxide in some of the histiocytic cells, but there was no histological evidence of damage resulting from the foreign body particles. The same observation was made by Dickson.[16] Büchner,[18] however, concluded that retention of the thorium produced functional weakening of the reticulo-endothelial system and also injured the lymph follicles of the spleen.

In the examination of the liver and spleen in eight of our cases we found the crystalline, refractile, brown globules of thorium phagocyted in the Kupfer cells of the former, and in the sinusoids and pulp cords of the latter. The liver, in five cases, presented central necrosis with a marked polymorphonuclear cell concentration, the necrosis being the gradually progressing type seen in chronic passive congestion. The spleen presented cell necrosis in four

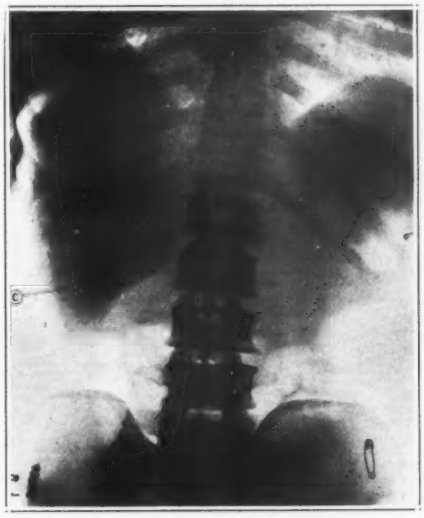


Fig. 3
The liver of a patient in whom thorium dioxide was injected, showing a mottled area (C) of the lower right lobe indicative of an early cirrhosis.

Fig. 4
The liver and spleen of a patient to whom thorium dioxide has been given, showing (N) light areas of secondary malignant nodules.

cases with an increase in polymorphonuclear cells. Whether or not the thorium was responsible for these changes, cannot be concluded because of the small number of cases studied.

ANIMAL EXPERIMENTATION

A vast amount of experimental work has been done on animals, with a variety of opinions as a result.

Shih and Jung[19] observed that after injection of large doses of thorium dioxide (3 c. c. per kilogram) in rabbits, there was definite diminution of the platelet count and the thrombocytic content of the blood with prolonged bleeding and clotting time. They concluded that there was a tendency to hemorrhagic purpura with actual hemorrhage into the organs in a few instances.

Lambin[20] noted that moderate doses of thorium in rabbits produced an erythroblastic reaction, while large doses produced pronounced anemia, recovery from which was spontaneous. In addition, the injection was followed first by leukopenia and then leukocytosis.

Oka[21] found no changes in dogs observed over a period of many months, except slight decreases in the hemoglobin, red count and platelet count, with slight leukocytosis, while Popper and Klein[22] found no significant changes in dogs, under observation for one month. This last report is in keeping with our investigation, in which we injected twenty-one rabbits with thorotrast, each receiving 1 c. c. per kilogram of body weight. Complete blood counts were made on these as well as on four uninjected rabbits every ten days over a period of two months. No appreciable change of any particular significance was noted in any of the animals. Proske[23] pointed out that blood counts on rabbits are very unsatisfactory, as there is a very great variation of the blood findings in this animal from day to day.

Irwin[24] found no damaging effects on any of the organs of rabbits after four months' observation; Radt[25] was unable to find any pathological changes in the liver and spleen of injected rabbits twenty-one months after injection. The same observation was made by Tripoli and Haam[26] after the injection of non-toxic doses of thorium in rabbits. When toxic doses of the chemical were used, however, Tripoli and Haam noted instances of emboli and minute necrosis in the spleen with retrograde changes in the liver and kidney.

Shute and Davis[27] reported widespread degeneration of the tissue of the liver and spleen of rabbits and dogs after the intravenous injection of thorium. The same conclusion was reached by Reeves and Apple.[28] However,

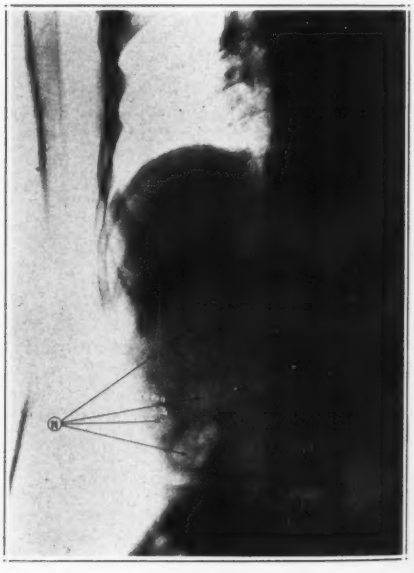


Fig. 5
The liver of a patient to whom thorium dioxide has been given, showing (N) numerous secondary carcinomatous nodules.

Chart 2

PER CENT THORIUM DIOXIDE RECOVERED FROM ANIMAL ORGANS

Organ	Control Rabbit (Uninjected)	Series A Rabbits 10 Days After Injection			Series B Rabbits 20 Days After Injection			Series C Rabbits 30 Days After Injection			Series D Rabbits 60 Days After Injection		
		1	2	3	4	5	6	7	8	9	10	11	12
Liver	0	34.0	28.6	41.3	40.4	26.4	34.6	38.3	39.2	35.7	30.5	50.1	35.7
Lungs	0	2.0	1.7	1.7	.8	0.1	1.3	2.0	0.6	1.3	.5	1.0	.4
Kidneys	0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spleen	0	7.2	6.1	15.3	.6	1.4	0.5	1.0	0.7	1.2	11.3	1.7	4.1
Total	0	43.2	36.4	58.3	41.8	28.4	36.4	41.8	40.5	38.2	42.3	52.8	40.2
Average per cent ThO_2, recovered from each series of rabbits	0		40.2			35.5			46.2			45.1	

Shute and Davis stated that the animals showed but few symptoms of distress, and at the end of three months the cells of the liver and spleen had regained almost a normal appearance, with practically no evidence of thorium in these organs.

Huguenin, Nemours and Albot[29] produced hepatitis and cirrhosis in rabbits after the injection of very large doses of thorium. Harris and Friedrichs,[30] in a series of fifty-three injected white rats, were able to demonstrate after forty-eight hours cast-like masses of small thorium granules in the sinusoids with marked parenchymatous degeneration of the liver, and in addition large, glassy thorium granules in the capillary tufts, with swelling of the renal epithelium. Harris[31] further noted that thorium dioxide, introduced subcutaneously in the area of perivascular lymph spaces by the Menville-Ané method,[32] caused a stimulating reaction upon the connective tissue with loss of lymphoid structure.

ELIMINATION

What of the elimination of this chemical from the body? Data as to this feature are rather incomplete. As pointed out above, Dickson[11] and Irwin[23] found that while the lungs are free of thorium soon after injection, the granules are found there several months later, indicating elimination by way of the bronchial mucosa.

Leipert,[33] who believes that elimination is mainly through the urine and bile, was able to recover 70 per cent of the injected thorium from the spleen, kidneys and liver of a rabbit injected three months previously and 98 per cent from one injected two months previously. In his work, Leipert used only one rabbit for each period of time. We carried out the same experiment, examining an uninjected rabbit as a control, and then three injected rabbits at the end of ten days, three after twenty days, three after thirty days, and three after sixty days.

The twelve rabbits were accurately weighed and each received 1 c. c. of thorotrast per kilogram of body weight. While the percentage of thorium recovered from the organs in our series was not as high as that of Leipert's, the amount found after sixty days was practically the same as the amount present after ten days (*Chart 2*).

Just how long the thorium remains in the tissues is questionable. In our series of cases, we obtained excellent roentgenograms in one patient three months after injections of thorotrast, in two patients nine months after, and in a fourth, sixteen months after injection.

RADIOACTIVITY

Thorium, like radium, gives off three forms of radiation and an emanation. Otell[34] pointed out that it breaks down very slowly into meso-

Fig. 6

A benign tumor (T) in the upper portion of the liver (L), found after the injection of thorium dioxide.

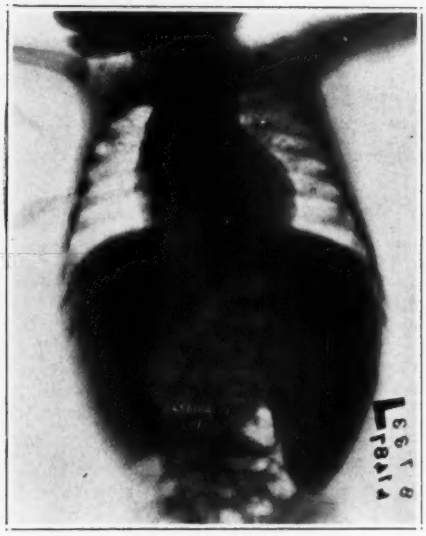


Fig. 7
Visualization of the liver and spleen in a patient with Banti's disease.

thorium, which gives off alpha, beta and gamma rays, and for this reason, a specimen of thorium may continue to increase in activity for several years. He and Yater[35] believe that the beta and gamma ray activity of the amount of injected thorium is probably too feeble to be of physiologic significance, but that the alpha ray activity is probably sufficient to be a potential source of danger when dispersed through the tissues. Stewart, Einhorn and Illick[36] placed a spleen of a patient who had received thorium over a photographic plate, and after only twenty-four hours an image was registered on the plate. This same investigation was carried out in our work. We used portions of six thorium-impregnated livers, four lungs and nine spleens. Each specimen of organ, 2 x 1½ x ½ inches, was placed in a separate Petri dish containing 10 per cent formalin solution, and the dish placed over a dental film. Another batch of organs was exposed directly to a series of dental films and observation of both groups made twenty-four hours, forty-eight hours, two weeks and four weeks after exposure. In addition, a number of portions of uninjected organs was exposed for the same length of time and in not one single instance did we obtain the least suggestion of an image on the photographic plate. Several other investigators reported negative results after similar experiments, among them being Bauman and Shilling,[17] Warfield,[10] Kdrnka,[8] Dickson,[11] Tripoli, Haam and Lehmann.[37]

In contradiction to this, Kdrnka[8] called attention to the striking therapeutic effect after thorium injection in patients with hepatic tumors. This was demonstrated in the definite diminution of the size of a malignant liver in two of our cases eight and ten months, respectively, after injection.

INDICATIONS

One can readily see the great variety of cases wherein this procedure may prove of inestimable value. Among these may be enumerated the following:

(1) To determine the nature of a liver disease (abscess, cyst, syphilis, cirrhosis, primary or secondary tumor or amyloidosis). It is probably of most value in determining the presence of secondary malignant growth of the liver. According to Erickson and Rigler,[13] it has become a routine preoperative test at the University of Minnesota Hospital in all cases of malignancy of the gastro-intestinal tract.

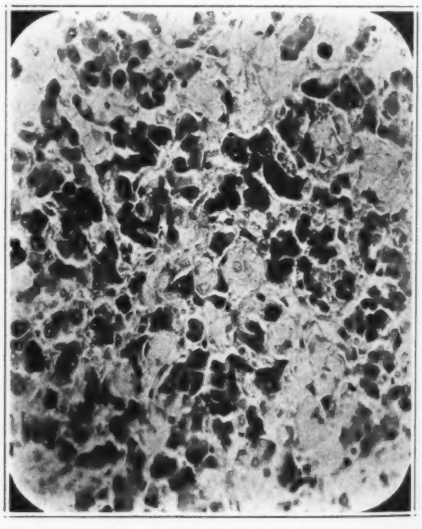


Fig. 8
A section of liver of a patient with Gaucher's disease. The black deposits of thorium are seen phagocyted in the larger Gaucher cells.

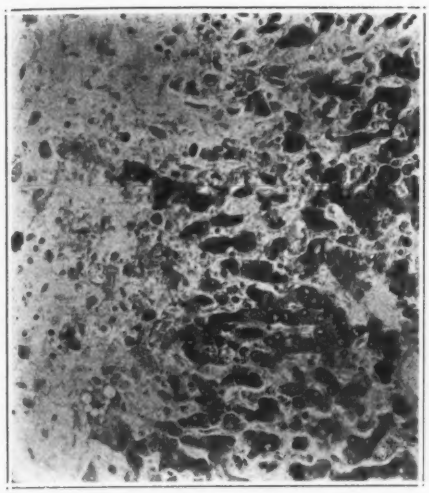


Fig. 9

A section of liver of a patient showing an area of focal necrosis with black deposits of thorium. Whether or not the thorium was the cause of the focal necrosis could not be determined.

(2) To determine whether a mass in the upper abdomen is liver or spleen. Visualization proved invaluable in one of our cases of tuberculous peritonitis, in which it was impossible to differentiate an upper abdominal mass from the spleen.

(3) To differentiate intrahepatic disease from common bile duct obstruction in chronic jaundice as indicated by Yater and Otell.[34]

(4) To ascertain the position of the diaphragm when it is difficult to decide whether a lesion is above or below it.

(5) To follow the progress of hepatic or splenic disease by means of films taken at intervals.

(6) To determine the possibility of traumatic rupture of the liver or spleen.

(7) To use thorium as a therapeutic agent in hepatic malignancy.

CONTRAINDICATIONS

In our experience, there have been no contraindications to the use of thorotrast. This has also been the experience of Erickson, Rigler,[13] Yater and Otell.[5] Kdrnka[38] called attention to the intolerance to thorium of patients with glandular insufficiency and dyscrasias of the blood; and pointed out that it is definitely contraindicated where there is a co-existent hepatic and renal insufficiency, because of the elimination through the bile and urine. Warfield[10] and Radt[39] consider jaundice and fever definite contraindications to the use of thorium. Three of our cases had definite jaundice and showed absolutely no untoward effects. We believe, however, that if used at all in jaundiced cases, the thorium should be administered very cautiously. Radt further pointed out the inadvisability of using thorium in the presence of a grave cirrhosis, fibrosis of the spleen or leukemia. Again, we used thorotrast in cases of cirrhosis and leukemia, with no apparent ill effect.

The experimental work of Bennett[40] proves the inadvisability of using thorium in cases of tuberculosis, due to the rapid dissemination of the disease through the tissues, after the injection of this chemical.

CONCLUSIONS

(1) Hepatosplenography, by use of thorium dioxide, is a definite adjunct to our diagnostic armamentarium.

(2) It is particularly useful in determining the presence of secondary malignant growths in the liver and proves of great value in preventing needless surgery in cases of malignancy of the gastro-intestinal tract.

(3) The procedure is free from reactions.

(4) The thorium is deposited mainly in the reticulo-endothelial cells of the liver and spleen, where it remains for months, elimination taking place very slowly, mainly by way of the lung and kidney.

(5) There is no appreciable change in the blood picture after the injection of thorotrast.

(6) Whether or not the thorium is injurious to the tissues of the various organs is questionable.

(7) While no image was obtained after exposing x-ray films to numerous organs impregnated with thorium, the change in the size of malignant livers after the use of thorotrast indicates that radioactivity takes place in the injected organs.

(8) Routine use of thorotrast should be rejected for the time being. While there has been no indication of untoward effect after the injection of this chemical, there is potential danger in the great length of time that this powerful

radioactive substance remains in the human body.

(9) The method should be used only in malignancy and other cases with a hopeless prognosis until a sufficient number of years has elapsed to determine whether or not the procedure is free from all danger.

BIBLIOGRAPHY

1. Einhorn, M.; and Stewart, W. H.: Med. Jour. & Rec., **126**:430-433, Oct. 5, 1927.
2. Radt, Paul: Klin. Wchnschr., **8**:2128-2129, Nov. 12, 1929.
3. Manufactured by Heyden Chemical Company.
4. Report of Council on Pharmacy and Chemistry. Thorotrast. J.A.M.A., **99**:2183-2185, Dec. 24, 1932.
5. Yater, W. M.; and Otell, L. S.: Ann. Int. Med., **7**:381-396, Sept., 1933.
6. Tripoli, C. J.; Haam, E.; and Lehmann, E. B.: Amer. Jour. Roent. & Rad. Ther., **27**:265-266, Feb., 1932.
7. Yater, W. M.; and Otell, L. S.: Amer. Jour. Roent. & Rad. Ther., **29**:172, Feb., 1933.
8. Udaondo, C. H.: Prense. Med. Argent., **18**:161-166, July 10, 1931.
9. Kdrnka, S.: (Translated by Ochsner, H. C.) Radiology, **18**:371-378, Feb., 1932.
10. McDonald, I. G.: Can. Med. Assn. Jour., **27**:136-137, Aug., 1932.
11. Warfield, C. H.: Radiology, **19**:311-319, Nov., 1932.
12. Lewisohn, R.: Surg., Gyn. & Obst., **55**:68-73, July, 1932.
13. Dickson, W. H.: Can. Med. Assn. Jour., **27**:125-129, Aug., 1932.
14. Erickson, L. G.; and Rigler, L. G.: J.A.M.A., **100**:1754-1764, June 3, 1933.
15. Stewart, W. H.; Einhorn, M.; and Illick, H. E.: Amer. Jour. Roent. & Rad. Ther., **27**:53-58, Jan., 1932.
16. Büngeler and Krautweig: Klin. Wchnschr., **11**:142-144, 1932.
17. Bauman, H.; and Schilling, C.: Klin. Wchnschr., **10**:1249-1252, July, 1931.
18. Büchner, F.: Klinische Wchnschr., **2**:1058, June 18, 1932.
19. Shih, H. E.; and Jung, T. S.: Proc. Soc. Exp. Biol. & Med., **29**:243-245, Dec., 1931.
20. Lambin, P.: Compt. rend. Soc. de Biol., **108**:264-266, Oct. 16, 1931.
21. Oka, M.: Fortschr. a. d. Geb. d. Rontgenstrahlen, **40**:497-501, 1929.
22. Popper, H.; and Klein, E.: München Med. Wchnschr., **78**:1829, 1931.
23. Preske, H. O.: personal communication.
24. Irwin, D. A.: Can. Med. Assn. Jour., **27**:130-135, Aug., 1932.
25. Radt, P.: Med. Klin., **26**:1888-1891, Dec., 1930.
26. Tripoli, C. J.; and Haam, E. V.: Proc. Soc. Exp. Biol. & Med., **29**:1053-1056, 1932.
27. Shute, E.; and Davis, M.: Arch. Path., **15**:27-34, Jan., 1933.
28. Reeves, R. J.; and Apple, E. D.: J.A.M.A., **100**:1682-1683, May 27, 1933.
29. Huguenin, Nemours and Albert: Compt. rend. Soc. d. Biol., **108**:879, 1931.
30. Harris, W. H.; and Friedrichs, A. V.: Proc. Soc. Exp. Biol. & Med., **29**:1047-1049, June, 1932.
31. Harris, W. H.: Proc. Soc. Exp. Biol. & Med., **29**:1049-1051, June, 1932.
32. Menville, L. J.; and Ane, J. N.: J.A.M.A., **98**:1796-1798, May 21, 1932.
33. Leipert, T.: Wien. Klin. Wchnschr., **44**:1135, Sept. 4, 1931.
34. Otell, L. S.: Radiology, pp. 148-155, Sept., 1932.
35. Yater, W. M.; and Otell, L. S.: J.A.M.A., **101**:507-514, Aug. 12, 1933.
36. Stewart, W. H.; Einhorn, M.; and Illick, H. E.: Amer. Jour. Roent. & Rad. Ther., **27**:53-58, Jan., 1932.
37. Tripoli, C. J.; Haam, E.; and Lehmann, E. B.: New Orleans Med. & Surg. Jour., **85**:487-492, Jan., 1933.
38. Kdrnka, S.: Schweizerische Medizinische Wochenschrift, **61**: 425-428, May 2, 1931.
39. Radt, P.: Verhandl. d. deutsch. Gesellsch. f. inner Med. Kong., **43**:443-451, 1931.
40. Bennett, G. R.: personal communication and scientific exhibit, A.M.A., Milwaukee, 1933.

ROENTGEN RAY STUDY OF THE PROSTATIC URETHRA WITH SPECIAL REFERENCE TO RESECTION*

By W. W. S. Butler, Jr., M.D.,
and
C. H. Peterson, M.D.,
Roanoke, Virginia

With the renaissance in our efforts to approach the prostate by the transurethral route, the method has not only taken a new growth, but has outgrown all normal limitations. Many have been tempted by the apparent simplicity of the procedure and the results reported by experienced men. They have been further urged by the public demand for a non-cutting operation so that a deaf ear is turned to the warning[1] to "the occasional instrumenteur" and they disregard the poor results obtained by the most skillful in their first hundred.

The roentgen ray is suggested as a help which brings each type of case on a common ground for study and for a discussion of results; it also shows the condition before and after resection, which may be fitted in with a clinical report of the result. It may explain a persistent infection with its attendant danger of sepsis, inability to void, or an incontinence. It permits a pictorial record of the results in any series or for comparison with the work of others. It is interesting to know the average amount of tissue removed by others, but more interesting to know just how far forward or laterally or posteriorly the cuts have been made in a specific case. Some patients apparently are relieved merely by cutting the internal sphincter;[2] with others it is necessary to bring the cuts right down to the veru montanum.[3 1]

Crabtree and Brodney[4] present a study in a group done by enucleation. Topographical views, as it were, of cases with unsatisfactory as well as satisfactory results are shown and in many the contracted internal sphincter presents a contrast to the funnel-shaped urethra present in the post-resection cases.

After resection, these patients fall into the following five groups: first, we have the group voiding in comfort with little or no residual urine, showing the funnel-shaped urethras converging to the external sphincter. Second are

*Read in Section on Urology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

those with residual urines who may be unable to void. They show the obstructing tissue which has not been removed, perhaps because the operator has failed to go far enough forward. Third are those with an incontinence or dribbling on exertion because the surgeon has cut too far forward. The incontinence has been temporary in my experience so far. The fourth group contains the malignant cases. In these, the funnel does not collapse so readily as in the benign type and a much smaller amount of tissue need be removed. If this observation proves correct, much unnecessary pain and hospitalization may be avoided. The urethrograms in the malignant type before resection are shorter and more vertical in contrast to the benign type which are much elongated and tilt forward on entering the bladder. The fifth group contains the late cases, that is, from three months to a year after resection. The funnel is apparently shallower and its contour smoother. There is no suggestion of the deep necrosis which we are warned against by Caulk.[5] In one, a stricture in the anterior urethra is seen which probably would have been avoided if oil had been used to lubricate the sheath of the electrome[6] instead of a water-soluble lubricant. In *Fig. 1* are shown a few urethrograms taken after resection.

A preliminary urethrogram shows the shape and length of the urethra and greatly aids interpretation of the postoperative urethrogram. The forward curvature at the inner urethra is produced by a posterior commissural hypertrophy. Flocks says that this is much more marked

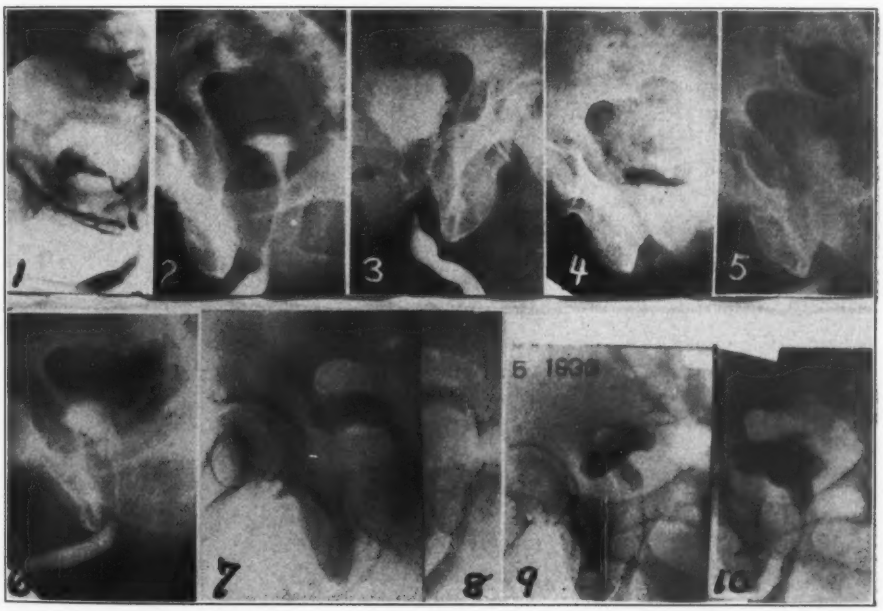


Fig. 1

(1) Cord lesion similar to the condition noted under spinal anesthesia. The relaxed internal sphincter may mislead the operator to think he has removed enough tissue.

(2) Note the funnel-shaped urethra after 9 grams of tissue have been removed, allowing complete emptying of the bladder.

(3) Thirty-three grams were removed with good result. The hypertrophy in this case was largely intravesical and excision did not extend forward.

(4) Removal of 10 grams allowed complete voiding. There was a delay in the clearing of urine and possible recurrence due to removing an insufficient amount of tissue.

(5) The funnel urethra is in a malignant hypertrophy; the cuts extended too far forward and allowed dribbling for six weeks. This same amount of cutting in a benign hypertrophy would probably have produced no incontinence.

(6) Same, three months later. The patient is feeling well and has no incontinence.

(7 and 8) In Fig. 8, the cut did not extend far enough forward and the patient could not void. In Fig. 7, 10 grams more removed, extending to the veru. There was temporary dribbling, but the urine was entirely clear and he had complete control when seen three months later.

(9 and 10) In this instance also, more tissue was removed at the second resection, allowing complete voiding. Fig. 9 shows failure to remove sufficient tissue at the posterior commissure.

in the subcervical hypertrophies. In carcinomas, the rule is that the urethra is shorter, straighter and much more constricted. A flattening of the urethra is produced by the lateral lobes. In doing a resection, it is essential that we know accurately the pathological condition present. I have removed sixty-three grams to have little discomfort and no severe reaction during the following twenty-four hours; and on the other hand had severe pains following removal of ten grams. To remove enough tissue from the right place is our goal. Flocks and Alcock[7] routinely take preliminary urethrograms and stereoscopic air cystograms. By an interpretation of the combined pictures, they make a diagnosis of median bar, large median lobe, frequently even subcervical or lateral lobes, both intravesical and intra-urethral. The latter, the intra-urethral, are more difficult to remove.

We do not take the preliminary urethrogram routinely on account of the extra manipulation and additional cost. The rectal, together with cystoscopic examinations immediately preceding resection, are relied upon, and rectal with a sound in the urethra. The air cystogram, however, requires no extra manipulation; a catheter must be introduced to get the residual urine and there is no additional discomfort to introduce a few syringefuls of air from an ounce syringe with the patient tilted laterally to an angle of about thirty degrees. Care is taken to drain all urine from the bladder before taking the picture and to let the air out immediately after

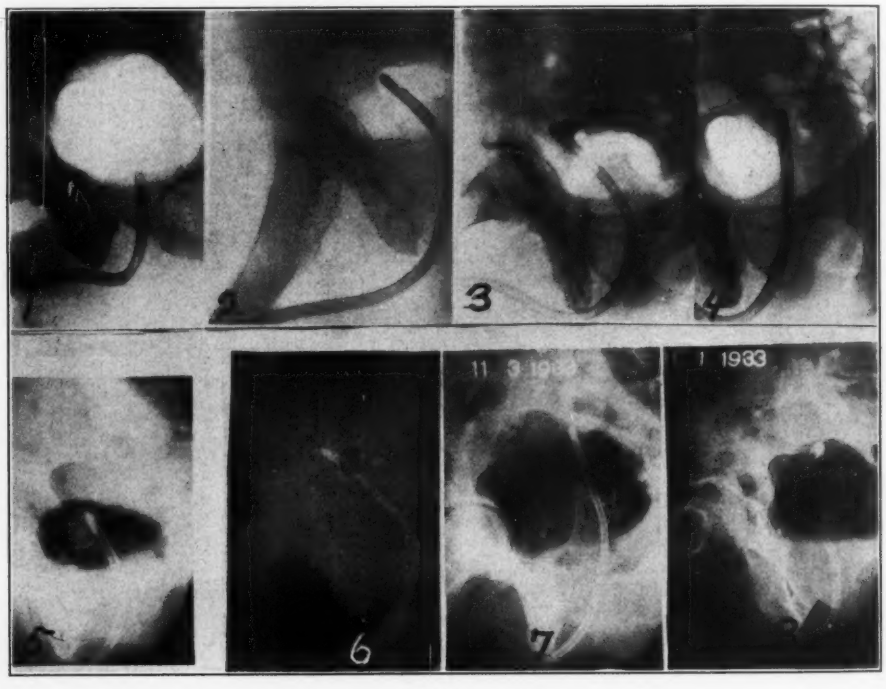


Fig. 2

(1) A normal concave bladder base with the catheter entering the bladder vertically.

(2) Lateral and posterior commissural hypertrophy. Note the convex bladder base elevating the internal sphincter. Twenty-eight grams were removed, allowing complete emptying of the bladder.

(3 and 4) The posterior commissure is pushing through the internal sphincter. Note the changed angle of the catheter after 24 grams were removed, allowing complete voiding.

(5) Hypertrophy associated with stones.

(6) Very much elongated urethra tilted forward. Sixty-three grams were removed with good result.

(7) Intravesical hypertrophy of posterior and lateral lobes; 52 grams were removed and the patient voided when the catheter was removed four days later.

(8) Apparently the ideal type for resecting. Ten grams were removed and the patient voided on the third day.

the catheter is released. An air cystogram taken at this angle has these advantages. It furnishes sufficient information to postpone cystoscopy until the anesthesia immediately preceding the resection; and it makes this cystoscopy easier. For the patient with early symptoms, not urgent, we have a concrete presentation of the cause of his trouble and are able to show him just what must be done without the discomfort of a cystoscopy. This preliminary picture presents an invaluable record for comparison with the subsequent course of the patient.

The sodium iodide cystogram, the stereoscopic air cystogram and the preliminary urethrogram are used only on special indications. While the air cystogram is suggested as part of the preliminary examination, it is only an accessory to the rectal and cystoscopic examination. It is my custom to use routinely the lateral and retrograde telescopes as well as the foroblique and to have on hand an extra foroblique as a protection due the patient.

In taking both air cystograms and urethrograms, the patient lies at an angle of thirty degrees with the lower knee and thigh flexed. For the urethrogram we use freshly prepared 15 per cent sodium iodide dissolved in equal parts of gynecologic jelly and water and the picture is taken during injection.

The results are based on seventy-one resections extending over little more than a year. During less than six months we have used the roentgen ray as an aid. The method was first called to my attention by Drs. Alcock and Flocks, of the University of Iowa, and I feel that there has been a marked improvement in our results since we have adopted it. It enables us to bring into the open the specific case, shows just what has been done, and I believe is more instructive than a summary of results alone. Forearmed with the information from the air cystograms and urethrograms and the rectal examination, our cystoscopic views are interpreted much more quickly and accurately.

Our illustrations are limited in number and are nothing like so clear as the original films. As one acquires practice in taking these films and in interpreting them in association with the cystoscopic picture of the patient, and bears in mind the course of the patient before and after resection, the films take on a real meaning. They become a clear permanent record and a help in the next case of a similar type.

REFERENCES

1. McCarthy, Jos. F.: The Prostate at the Crossroad. Amer. Jour. Surg., New Series, **15**:435-40, March, 1932.
2. Boyd, Montague L.; and Bailey, M. K.: Transurethral Prostatic Resection: What Happens at and After Operation. Piedmont Hospital Bulletin, vol. **6**, Sept., 1932.
3. Ballenger, Edgar G.; Elder, O. F.; and McDonald, H. P.: Prostatic Resections: Analysis of 82 Transurethral. Bulletin of Crawford W. Long Memorial Hospital, Nov. 30, 1932.
4. Crabtree, E. Granville; and Brodney, M. Leopold: An Estimate of the Value of the Urethrogram and Cystogram in Prostatic Obstruction. Jour. Urol., **29**:235, March, 1933.
5. Caulk, John R.; and Patton, John F.: Influence of the Type of Current upon the Postoperative Complications in Transurethral Surgery. Jour. Urol., **30**:537, Nov., 1933.
6. Bulletin by Leibel Flarsheim Co. on Prostatic Resection.
7. Flocks, R. H.: The Roentgen Visualization of the Posterior Urethra. Jour. Urol., **30**:711, Dec., 1933.

DISCUSSION (*Abstract*)

Dr. Wm. H. Toulson, Baltimore, Md.—I have never done a resection of this type. I have seen many urethrograms, however, and Dr. Butler's work looks very promising. Some ten or twelve years ago, Bumpus called our attention to the value of urethrograms along with cystograms in prostatic obstruction. He pointed out that pyelograms had to be studied thoroughly and our interpretation of them had changed over a period of years, and suggested that probably it would take us some time to become accustomed to the interpretation of urethrograms. Crabtree, in the *Journal of Urology* about two years ago, reiterated what Bumpus had said, and he regards urethrograms as invaluable aids. I also note that Allcock stresses them and does urethrograms routinely in all of his prostatic cases before resection.

Urethrograms are most valuable in small adenomas between the two sphincter muscles of the bladder. We have often missed these little enlargements of the prostate deep down in the urethra. Urethrograms will show the changes in the prostatic urethra where we badly need enlightenment.

In the poorer results it is difficult to tell whether enough resection has been done or whether poor function is due to the infection that is sometimes ingrained in the bladder wall or upper urinary tract. Urethrograms should help to settle this point.

Dr. Butler (closing).—The retrograde cystoscope allows a view from within the bladder forward and shows clearly the obstructing mass, even outlining its shadow against the bladder wall. This preliminary estimate of just what must be removed gives a decided advantage. The fluid in the bladder must be entirely clear, so that for observations during and after resection, it is not so satisfactory as the closer vision foroblique telescope.

Views of the urethra obtained after resection not only present a certain distortion from the rigid cystoscope, but the relaxation of the anesthetic fails to show tissue which will be thrown directly into the urethra when the supporting structures regain their tone. To avoid these misconceptions, the air cystogram and urethrograms before and after resection show an outline of the urethra as it is.

Dr. Boyd's slides show actual photographs by Tandler and Zuckerkandl which are far preferable to the usual schematic illustrations shown. Dr. Randall's "Surgical Pathology," depicting life size photographs with brief clinical history presents the problem more accurately than anything I have seen.

THYMIC DANGERS*

By Roy E. de la Houssaye, M.D.,
New Orleans, Louisiana

The importance of the role which the thymus plays in producing symptoms in infants varies, according to many authorities. From my own personal experience I am convinced that the thymus at times constitutes a real danger to an infant.

Embryology.—The thymus is developed from the caudal aspects of the third and fourth branchial pouches. The main part of the thymus originates, according to most authorities, from the third pouch, while that coming from the fourth branchial pouch may be found associated with the thyroid.

Anatomy.—The thymus lies in a compartment of the cervical fascia of the mediastium separated from the neck by a fibrous diaphragm. It is a lymphoid structure which gradually disappears, leaving Hassal's bodies as the most characteristic remnant of the epithelial tissue. It is made up of lobes and lobules, having interlobular, fibrous, and some areola connective tissue. The thymus derives its arterial blood supply from the thyroid vessels, in part by way of branches from the superior and inferior thyroid arteries, as well as from the pericardial arteries. It is also supplied by branches of the internal mammary artery. The veins from the thymus end in the left innominate vein, the thyroid veins, and the internal mammary veins. The lymphatics of the thymus are briefly described in most text-books of anatomy as ending in either anterior mediastinal, tracheo-bronchial, or sternal lymph nodes. The nerves of the thymus are very minute. They are derived from the cervical sympathetic and from the vagus and reach the thymus for the most part, along with the blood vessels which they accompany.

Physiology.—The function of the thymus gland is very obscure. In fact, nothing definite is known about it. Tongu, Park and McClure report that experimental complete thymectomy is not followed by the death of the animal. These investigators, therefore, maintain that, whatever the function of the thymus, it is not essential to the life of the organism.

Thymic dangers, to many, may seem as mere hallucinations of the author. The following case histories demonstrate, however, that the thymus may be a definite menace and one which requires prompt treatment.

Case 1.—B. B., a male infant, a premature twin, of induced labor, birth weight four pounds, four ounces, the first six weeks gained weight daily and was happy. During the ensuing two weeks the child cried with colic for two to three hours a day; had noisy respiration; vomited occasionally, and slept with the head thrown back, which gradually became worse until a marked opisthotonus developed. I felt that the symptoms were due to a diseased thymus. A roentgenogram was advised. The father of the baby suggested that I also take a roentgenogram of the spine. Roentgen ray examination of the chest showed a marked thymic enlargement confined entirely to the right side. The shadow extended well down into the mid-portion of the chest. The dorsal spine was negative. Radium therapy was instituted the following day. The treatment consisted of 100 mg. of radium with 1 mm. brass filter, one inch from the skin, for five hours. The symptoms disappeared almost miraculously and the infant progressed normally. Two months later a roentgenogram showed evidence of a thymus of the same size and shape as the first, but there were no thymic symptoms at this time. Two and one-ha'f months from the date of the second roentgenogram a third was taken, which still showed evidence of a very large thymus extending both to the right and left. Eight months from the date of the first roentgenogram a fourth was made. This still showed no appreciable change in the size of the thymus. A blood count made on this date showed: white cells 13,750, neutrophils 28 per cent, and lymphocytes 72. The family had been insisting that I give the baby further treatment because of the persistent roentgen ray appearance of the thymus. As the fourth roentgenogram showed no improvement, I acceded to their demands. A second application of radium was made. Four months after the second application of radium, the fifth roentgenogram showed no evidence of thymic enlargement. The child, at the age of two years, recovered from an attack of bronchopneumonia with definite consolidation of the entire left lung. He never appeared desperately ill and ran a temperature of 102 to 104° for eight days. He is now two and one-half years old and enjoying good health.

Case 2.—P. A. R., a female infant of normal delivery, birth weight seven pounds, one ounce, at five weeks developed a cough. She slept with her head retracted and, on crying, became cyanosed. A diagnosis of thymic disease was made. Roentgen ray examination showed an enlargement of the thymus to the right and left. Roentgen ray treatment was instituted. The treatment consisted of 140 kilovolts, 5 milliamperes, 20 inches from the skin, ¼ mm. copper and 1 mm. aluminum for five minutes. Ten days following roentgen therapy, the baby had a slight head cold. I was spraying the nose with a mildly medicated oil when the baby became cyanosed and later became white and limp. The following day another roentgen ray treatment was given. One week later the baby had her most severe cyanotic attack, with convulsive twitchings. She was unconscious for many minutes. The following day radium was used. The treatment

*Read in Section on Pediatrics, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

*From the Department of Pediatrics, Graduate School of Medicine, Tulane University.

was 100 mg. of radium with 1 mm. brass filter, one inch from the skin, for five hours. The infant had no further attacks and has developed normally. She is now three years old.

It is possible that in this case the roentgen ray, in insufficient quantity, stimulated the thymus instead of exerting a destructive effect on it. Roentgen ray therapy is hazardous. The baby must be held by other persons, who run the risk of exposure to high voltage currents and to the roentgen ray beams in their efforts to keep the patient still and in the proper position. Lead masks placed to expose the thymic area are apt to slip and this causes the treatment to be administered where it will do no good, and possibly harm.

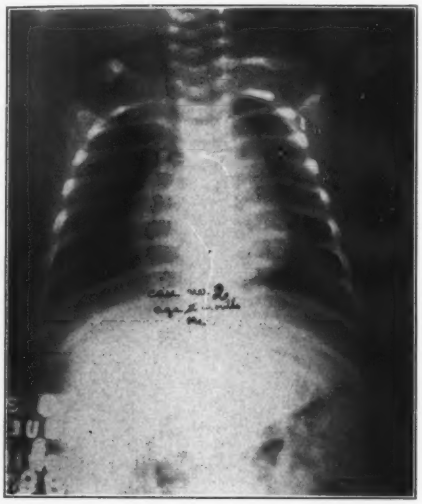


Fig. 1, Case 2
At age of one month, enlarged thymic shadow.

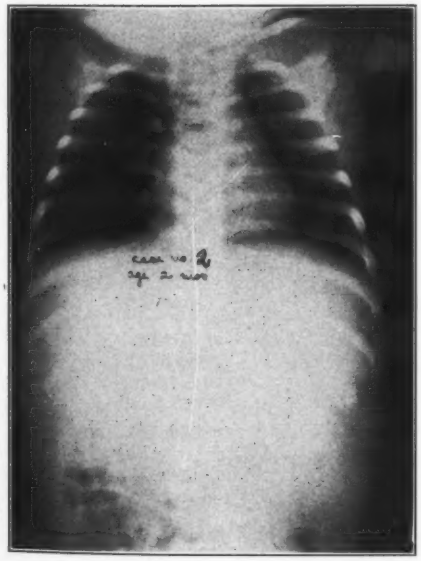


Fig. 2, Case 2
At age of two months, one week after radium therapy.

Case 3.—J. L. was a male infant of normal delivery, birth weight six pounds, seven ounces. I had the opportunity of seeing this case in consultation and was able to follow it in detail. At the age of nine months a roentgenogram of the chest showed a very marked thymic enlargement to the right and left, extending 4 cm. to either side of the median line. Three roentgen ray treatments were given within a period of three weeks. The first consisted of 140 kilovolts, 5 milliamperes, 20 inches from the skin, ¼ mm. copper and 1 mm. aluminum, for three minutes; the second treatment, 140 kilovolts, 5 milliamperes, 20 inches from the skin, ¼ mm. copper and 1 mm. aluminum, for five minutes; and the third treatment was the same as the second. This infant, after his last roentgen treatment, appeared acutely ill. His hemoglobin had dropped from 75 to 40 per cent, his red cells were 2,720,000, white cells 9,500, neutrophils 34 per cent, and lymphocytes 66. One month after the first roentgenogram, examination of the chest showed a marked thymic enlargement.

Radium in treatment of the thymus is not without its dangers. However, those who have used both roentgen ray and radium will always prefer radium. Radium is easily placed and retained in the desired location without producing any alarm or discomfort to the patient. Radium must be kept at the selected skin distance or the dosage will be entirely different from that desired. Very small changes in this distance make considerable difference in dosage. The practice occasionally followed of rolling the radium up in a piece of gauze as an applicator is a dangerous one and cannot be condemned too strongly. It is important that the radium applicator should be covered on the upper surface with lead because it comes high up under the baby's chin and is apt to produce a burn at that place unless this precaution is taken. No one should attempt to use radium unless he is thoroughly familiar with it. The following case is cited in order to demonstrate what may happen when radium is not properly used or when there is a mistaken diagnosis.

Case 4.—S. L., a full-term male infant of normal delivery, weighing four pounds, four ounces, had frequent cyanotic attacks. When he was three months old the mother was told by her obstetrician that the baby had a bad heart. The pediatrician disagreed and had a thoracic roentgenogram made for an enlarged thymus.

The child was treated with radium when five months old. I have been unable to ascertain the dosage used; the length of time, however, was nine hours. The baby was brought to me at the age of nine months. He weighed twelve pounds, thirteen ounces; measured 24½ inches in length; appeared slightly cyanosed; his muscle tone was poor; the anterior fontanel was wide open; there was a congenital pupillary defect of the right eye; an abscessed right ear; the lymph nodes were not palpable; and there was a systolic murmur over the second left interspace. Upon the last mentioned finding, I was able to make a diagnosis of pulmonary stenosis. The baby, under careful management and feeding, developed and progressed. When he was two years old, a beginning clubbing of the fingers was noticed. A roentgenogram was made at the age of four and a half years, which showed "a large shadow behind the sternum, which is somewhat suggestive of a retrosternal thyroid. The heart is entirely globular in outline and is markedly enlarged to the left and also the right, and is strongly suggestive of a pericarditis with effusion." Several days later roentgenographic examination of the chest showed evidence of a pericarditis with effusion. After I had had a personal consultation with the roentgenologist, giving the history, a diagnosis of congenital heart, and not pericarditis with effusion, was made. When he was five years old this child was unable to talk; he could only produce blowing sounds. Dr. F. E. Lejeune examined the child's larynx, and subsequently did a suspension laryngoscopy. He reported:

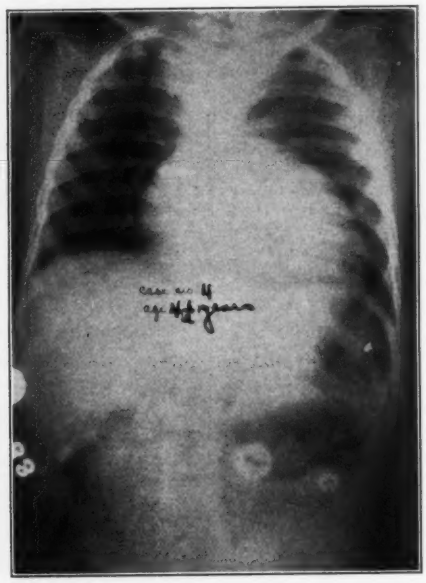


Fig. 3, Case 4

At the age of four and one half years incorrect diagnosis was made by roentgenologist. One can readily see how diagnosis of enlarged thymus was made when the infant was only a few months old.

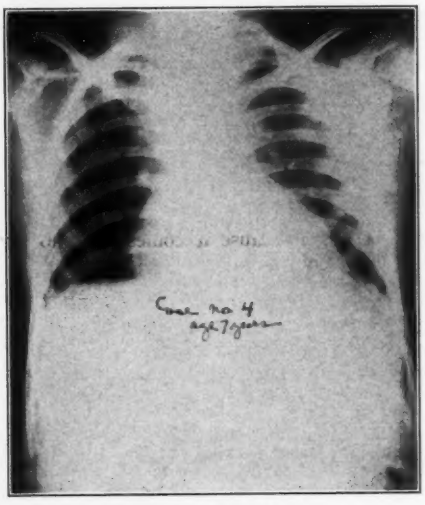


Fig. 4, Case 4

At age of seven years.

"A direct examination of the larynx disclosed the fact that a cicatricial web extended across to both cords from the anterior commissure to the vocal processes. There was a small opening at the posterior part of the larynx through which the child breathed. It was a very small opening and it was amazing to see how well the child had gotten along with the limited amount of air intake. The web, of course, interfered with phonation as well as respiration. The web was grasped with a pair of laryngeal forceps and dissected free from its attachment to both vocal cords and at the anterior commissure. Dilatation of the larynx was necessary for a period of time to prevent the cords from growing together, due to the raw surface on each of them. In due course of time there was perfect healing so that the child has now developed a fairly good voice."

Dr. Lejeune felt that this web was caused by some type of trauma or irritation of the larynx. Concluding his report, he stated that he had never before seen such an isolated congenital web.

A paper on thymic dangers would not be complete without mention of the now well established term, status lymphaticus, suggested by Arnold Paltauf in 1889. We are all familiar with the case of the infant who dies suddenly and from apparently no cause, in which necropsy reveals no lesion, but a thymus weighing thirty to forty grams. Many authorities consider the normal weight of the thymus fifteen to forty grams. Occasionally such an infant, child, or adult dies suddenly during the administration of an anesthetic. Such a condition is usually diagnosed status lymphaticus. In investigating the concept of status lymphaticus there must be a study, first, of the thymus under various conditions. Until one knows, for instance, what the average normal weight of the thymus really is and how variable that weight is amongst

persons of the same age under similar conditions and again what may be the effect of other factors, such as general nutrition of the body, length of illness leading up to death, or the environmental conditions preceding a sudden death, it clearly cannot be sensible to assert in a particular case that the weight of the thymus is abnormal. Diagnoses established wholly or mainly upon alleged abnormality of weight of the thymus have no more value than affirmative evidences in cases of witchcraft. In case of sudden death the old inquest verdict, "died by the visitation of God," is at least as scientific and more modest than status thymicus or status lymphaticus. "Cause unknown" is preferred to either.

BIBLIOGRAPHY

Anderson, Dorothy H.: The Relationship Between the Thymus and Reproduction. Physiological Reviews, **12**:1-22, 1932.

Chouke, K. S.; Whitehead, R. W.; and Parker, Alice E.: Is There a Closed Lymphatic System Connecting the Thyroid and Thymus Glands? Surg., Gyn. & Obst., **54**:865-871, 1932.

de la Houssaye, Roy E.: Diagnosis and Treatment of the Enlarged Thymus. New Orleans Med. & Surg. Jour., **86**:91-96, 1933.

Friedman, G. A.: A Brief Discussion on the Possible Role of the Thymus in Graves' Disease and Myxedema. Med. Rec., **100**:806-807, 1921.

Greenwood, Major; and Woods, Hilda M.: Status Thymico-Lymphaticus Considered in the Light of Recent Work on the Thymus. Jour. Hyg., **26**:305-325, 1927.

Grier, G. W.: The Diagnosis and Treatment of Enlarged Thymus. Amer. Jour. Roentgen., **11**:141-146, 1924.

Hewer, Evelyn E.: The Direct and Indirect Effects of X-Rays on the Thymus Gland and Reproductive Organs of White Rats. Jour. Physiol., **50**:438-458, 1915-1916.

Howell, Wm. Henry: Text-book of Physiology, 12th Edition, pp. 924-925. Philadelphia: W. B. Saunders, 1933.

Kinkard, Kerwin: A New Conception of Thyroid Function and the Interrelation of the Thyro-thymic Apparatus. Jour. Mo. State Med. Assn., **28**:309-314, 1931.

Konikow, M. J.: An Enlarged Thymus in an Infant: Tetany After X-Ray Treatment. Endocrinology, **9**:70-75, 1925.

Morris, Henry: Text-book of Human Anatomy, 5th Edition, pp. 1319-1323. Edited by C. M. Jackson, M.S., M.D. Philadelphia: P. Blakiston's Son & Co., 1914.

Parker, Charles A.: Surgery of the Thymus Gland: Thymectomy. Report of Fifty Operated Cases. Amer. Jour. Dis. Child., **5**:89-122, 1913.

DISCUSSION (*Abstract*)

Dr. St. Geo. T. Grinnan, Richmond, Va.—Dr. Morse, of Boston, regards thymic danger as very rare or not existing. Dr. E. A. Park, of Johns Hopkins, says he has never seen an enlarged thymus that gave trouble, either in America or Europe. I have never seen a case in which the thymus gave trouble. It is possible that x-ray diagnosis or interpretations are not correct. Some other condition rather than thymic hypertrophy should be sought.

Dr. J. LaBruce Ward, Asheville, N. C.—Far be it from me to take issue with eminent authorities; however, when one sees certain definite symptoms such as cyanosis, syncope, head retraction and dyspnea which are commonly attributed to thymic enlargement, and sees these symptoms disappear after a few x-ray treatments, one is not justified in withholding therapy. To do so is simply to play into the hands of the undertaker. To say that an enlarged thymus cannot produce such symptoms is splitting hairs. Whether the symptoms are produced by an enlarged thymus or not, the patient will probably die unless x-ray therapy is promptly used. This is the only important thing for us to bear in mind. It is not the cause of the symptoms, but the prevention of death which is of importance to the patient.

Dr. M. Pinson Neal, Columbia, Mo.—The thymus occupies a critical space at the superior opening of the thorax. This space between the sternum in front and the vertebral column behind in young infants is only from 2 to 3 cm. in its anteroposterior diameter. If the thymus increases its size at a rate in excess of the development of this critical space, or if it becomes swollen from edema or other cause, danger becomes imminent. The child with an enlarged thymus is the child whom our predecessors called the scrofulous child, the "angelic child of Gross." Paltauf pointed to the symptom-complex and showed that the enlarged persistent thymus is but one of a combination of anatomical imperfections occurring in the same body and constituting the condition we recognize under the term "status lymphaticus."

The angelic child of Gross is usually female, has an active thyroid, and is one that is "delicately molded, beautifully proportioned, blue-eyed or brown, with long lashes, finely chiseled features, transparent cheeks and rapid mutations in coloring, thin lips, smooth, velvety skin, and silk-like hair, shapely limbs and quick, graceful movements, narrow waisted, mentally alert, often precocious, a thing of beauty, but lacking in the full promise of life." All thymic children, however, are not as attractive as this. We have much the opposite in the dullard, who is an ugly, mentally and physically sluggish, coarse featured, and sometimes rachitic, individual, usually a boy, with an inactive thyroid, enlarged tonsils and adenoids, but even they have the fine, velvety skin, delicate hair and shapely limbs.

The dramatic suddenness of the thymic crisis terminating in death is only one of the pictures that we must carry with us. In fifteen cases studied, I have been struck by a type having unstable emotions, irritative symptoms, even to convulsive seizures, with opisthotonos or other muscular rigidity that brought up the question of differentiation from tetanus, meningitis, and strychnine poisoning. Most of them showed evidence that other glands were involved. It is recognized that if one of the endocrine glands is dysfunctional, the whole regiment becomes jangled and out of step. Status lymphaticus is an example in which the relationship of these glands is manifest. It is quite certain that the leading part of the gland travesty is played by the thymus and that were it not for thymic enlargement there would be no such condition. The clinical retrogression or suppression of the manifestations that occurs following radiation therapy with shrinkage of the thymus strongly supports this belief.

The theory of Symmers that death occurs by anaphylaxis from an autoprotein sensitization is based upon the finding of histologic focal necroses in the spleen and lymph nodes in these cases. It is not believed that many of the thymic deaths are due to tracheal compression, though this probably accounts for a small percentage of them.

For those who express a disbelief in status lymphaticus an an entity, there remains the problem of establishing a proof of another cause of this syndrome and

giving it a designation that would be more adaptable and acceptable. Merely to change the title could no more alter the clinical conglomerate picture and the facts than changing the name of a rose would alter its fragrance. Status lymphaticus was probably first recorded in 1889, but I have recorded a belief that we find evidence of it in biblical times in the death of Ananias and Sapphira, his wife.

Dr. William B. McIlwaine, Petersburg, Va.—In discussing the thymus we should each take a critical attitude toward our cases. Simply because some men, who are outstanding in the profession, say that there is no such thing as an enlarged thymus giving symptoms does not make it true. Just because a group of men from New Orleans report all kinds of symptoms resulting from enlarged thymus does not make it true. We shall have to try to coördinate these two extreme views. I believe that there is very definitely a symptom-complex in some newly born infants giving rise to typical "blue spells." These infants on x-ray examination show a definitely enlarged shadow where the thymus is supposed to be, and the condition is relieved by radiation over this area. I do not care whether you call it thymus disease or X, Y or Z. I still believe we have a clinical entity which we should be on our guard to diagnose and treat correctly.

THROMBO-ANGIITIS OBLITERANS AS A GENERAL VASCULAR DISEASE*

By THOMAS P. SPRUNT, M.D.,
Baltimore, Maryland

The recent interest in the study and treatment of peripheral vascular disease has focused attention upon thrombo-angiitis obliterans along with other members of its group. This group may be roughly divided into (1) the organic occluding diseases (arteriosclerosis and thrombo-angiitis obliterans), and (2) functional disorders with marked vasoconstriction or vasodilatation, including Raynaud's disease, erythromelalgia, and similar conditions. Transitions or mixed pictures occur. Although thrombo-angiitis obliterans is recognizable as essentially an organic, inflammatory, thrombotic, occlusive disease, it is now well known that frequently there is a functional or spastic element, an autonomic nervous element, toward which many of the modern tests and methods of treatment are directed.

This disease occurs in young people, that is, in the first half of the ordinary life span, in many races, but with peculiar frequency in the Jewish race, and it is almost confined to the male sex. There are complaints of pain in the foot or leg, pain on exercise relieved by rest (intermittent claudication), of paresthesias, of muscular weakness. There is an absence of symmetry in the involvement, a probable persistent absence of pulsation in the peripheral arteries of the foot and leg, a difference in the skin temperature on the two sides, and more or less characteristic color changes of the skin when the leg is elevated and when it is depressed. Interesting diagnostic considerations include: (1) differentiation between an occluding and a functional process; (2) differentiation between the inflammatory thrombo-angiitis and the degenerative arteriosclerosis, which is aided by the relative youth of the former and the absence of calcification of the arteries on x-ray examination; and (3) a determination of the degree of arterial spasm, if any, in association with the organic occluding process.

The etiology of thrombo-angiitis is unknown. Indeed, the whole subject bristles with problems including those of the distribution of the lesions and ultimate fate of the patient, the ones with which we shall just now be mainly concerned.

It is to Buerger that we chiefly owe the conception that thrombo-angiitis is a clinical and a pathological entity, and the debt to Buerger is indicated by the fact that the disease frequently goes by his name. He believed that the condition was confined to the peripheral arteries and veins and that concomitant disease of the inner arteries was due to arteriosclerosis; hence there arose the impression that if, in a case with peripheral vascular disease, there are signs of involvement of an inner organ like the heart, this in itself suggests a diagnosis of arteriosclerosis rather than of thrombo-angiitis.

Buerger's disease is recognizable clinically only as a peripheral vascular disease and the extensive study of its pathology has been based almost entirely upon amputated material. Autopsies have been remarkably few, a fact due partly to the orthodox Jewish objection to them, and partly perhaps to the surgical disposition of most hospitalized cases, and unfortunately to the usual success in securing a biopsy by amputation for gangrene. In 1928, Lemann reported a case with an autopsy and found the records of five other autopsies. I have found this year the reports of eighteen cases with autopsy, including several that were evidently studied with great care.

My interest in this phase of the disease was aroused a year or two ago by the observation of two cases at the same time, one giving evi-

---

*Read in Section on Medicine, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

dence of involvement of the mesenteric arteries, a rather unusual clinical complication, and the other with coronary artery disease, a definitely more common clinical association. One finds in the literature that a similar interest in the general pathology of the disease and in its distribution has been occasionally shown by other clinicians, including Lemann, Dean Lewis, Taube, Barron and Linenthal, Idelson, and others. Idelson reported 358 cases of intermittent claudication from his practice in Riga. One gets the impression from reading his article that the great majority of these cases were examples of thrombo-angiitis. In two cases there was a sudden blindness in one eye from thrombosis of the central artery of the retina. In 24 of his cases there was a sudden heart death. He thinks that if more cases could be followed successfully this would be a common type of death among them. He also speaks of the frequency of anginal symptoms that occurred in 54 cases. Hemiplegia occurred in 28 cases. He was impressed with the favorable or benign aspect of these hemiplegias that sometimes cleared up remarkably quickly, in a week or in a month or so.

The most careful and thorough autopsy reports of those of Jäger, who reported four cases and collected seven others. In all of Jäger's cases the lesions were widespread, as he well illustrates in his diagrams. Indeed, in the entire list of eighteen autopsies, there was no case without lesion of the visceral arteries, and in most of them the distribution was extensive, as is indicated in the statistical summary of the cases. Autopsies have been reported by Buerger (3 cases), Perla, Göcke, Dürke, Jäger (4 cases), Nordmann u. Reuys, Norpoth, Cserna, Lewis, Lemann, Ackman, Livingston, and Oppel.

A general statistical summary of the autopsy findings follows:

THROMBO-ANGIITIS OBLITERANS: ANALYSIS OF 18 AUTOPSIES

Age: average at death in 17 cases = 41 years (extremes 21-55). Onset of symptoms, third or fourth decade in 14 cases.

Duration of symptoms: average of 14 cases = 9.9 years (2-20).

Amputation: lower extremity, 11 cases; bilateral, 6; hand, 1.

Site of Involvement	No. Cases
Smaller arteries of legs	18
Femoral arteries	14
Iliac arteries	12
Aorta	14
Arteries of upper extremities (occluded in 5)	10
Carotid, basilar and other cerebral arteries	7
Cerebral hemorrhage, softening or scars	7
Coronary arteries (occluded in 7)	13
Myocardial infarction or scars	9
Mild endocardial changes	7
Renal arteries	8
Kidney infarctions or scars	8
Celiac axis	3
Spleen, infarctions and arterial changes	6
Stomach and duodenum, scars	2
Superior mesenteric artery	6
Intestine	
Hemorrhagic infarction	2
Perforating ulcers	1
Spermatic artery	1
Lungs, scars or occlusion of small arteries	4

The nature of the lesions in the visceral arteries and in the aorta is not entirely clear in all of the cases. Buerger considered them arteriosclerotic in his cases. In many of the cases with microscopic examination, these lesions are quite similar to those in the peripheral vessels. In certain cases both types of lesions are present. This would seem to indicate a definite susceptibility of the arteries to disease at this relatively early age. Jäger goes into the pathological histology very carefully and considers the morphological changes quite variable. He described them under five headings: (1) the canalized vascular occluding tissue, (2) the fresh thrombus, (3) the intimal thickening, (4) the fibrinoid necrosis, and (5) the inflammatory processes in the finer arteries of about 300 u. diameter that are quite similar to those described in periarteritis nodosa.

Study of the available autopsy material would seem to indicate that thrombo-angiitis obliterans is a general vascular disease, probably in its early stages, and certainly in its later stage, and that these patients die of vascular complications with a regularity quite comparable to that of the ordinary cases with arterial hypertension.

Keeping these facts in mind, an additional responsibility devolves upon the clinician in the recognition during life of these visceral complications. We are prepared to recognize the occurrence of coronary or of cerebral thrombosis and occlusion. Occlusion of vessels in other viscera usually goes unrecognized. In a stimulating paper last year, Conner attempted to construct a diagnostic framework for the recognition of thrombosis and infarctions in the various viscera, based upon what we know of coronary occlusion and of embolic phenomena in the different viscera. Although he apparently did not have thrombo-angiitis obliterans particularly in mind, his remarks were entirely pertinent to this situation.

SITES OF VASCULAR INVOLVEMENT IN THROMBO-ANGIITIS OBLITERANS. FROM NECROPSY FINDINGS IN EIGHTEEN CASES

Author	1924 Buerger Case I	1924 Buerger II	1924 Buerger IV	1925 Perla	1927 Gocke	1931 Durck II	1932 Jager I	1932 Jager II	1932 Jager III
Disease duration	23-28 year of life	21	35-41	28-47	23-35	38-40	31-48	34-39	32-52
Toes, left	Amputated	Amputated	Amputated	Amputated	Amputated	Obliterated	Amputated	Necrosis	Partial oblit.
Feet								Partial oblit.	
Leg, right	Amputated		Amputated	Amputated	Art. oblit.	Amputated	Amputated	Obliteration	Partial oblit.
Femoral, left		Thrombosis	Obliterated	Partial oblit.	Obliterated	Obliterated	Obliterated	Polypoid; int. thick.; A. profunda thromb'd	Obliterated
Artery, right				Partial oblit.	Obliterated	Obliterated	Obliterated		Obliterated
Iliac, left		Thrombosis	?	Thrombus		Wall thickening	Parietal thrombus "Fibrinoid"	Intimal thickening with parietal thrombosis	Thrombus
Artery, right				Thromb. & oblit.					
Aorta, abdominal	Atherosclerosis	Mural thromb. on ulcers. Cell in filtrated media	Organizing thrombus	Thrombus			Parietal thrombus "Fibrinoid"	Intimal thickening with parietal thrombosis	Ulcer with parietal thrombus
Aorta, thoracic				Int. plaques					
Arms, left			Circulatory defect	Hand amputated	Radial oblit.		Oblit. radial.	Circulatory defect	
right				2 fingers amput.	Brachial oblit.				
Carotid and basal arteries					? "Unklar"			Partly oblit.	Oblit. and thrombus
Brain								Scars, hemorrhages; periart. nodosa	Old and fresh softening
Coronaries	Left desc. branch occluded	Nodular atheroma	Intimal plaques	Lt. oblit.		Narrowed by intimal thick.	Obliterated	Obliterated	Arteriosclerosis
Myocardium	Interstitial myocardium	Infarct		Scars		Heart death	Scars	Scars	
Renal arteries			Old thrombus, right	Thrombus both sides				Malignant scler.; interlob. A. oblit. periart. nodosa	Thrombus
Kidney	Infarct scars	Many infarcts						Contracted kidney	Scars and infarcts
Celiac artery		Thrombosis							
Spleen	Two infarct scars	Many infarcts Thrombosis						Arteriosclerosis Periart. nodosa	
Stomach									
A. mes. sup.		Thrombosis					Obliterated		
A. spermat.									
Lung								Scars (inf.)	Obliterated
Intestines									

SITES OF VASCULAR INVOLVEMENT IN THROMBO-ANGIITIS OBLITERANS. FROM NECROPSY FINDINGS IN EIGHTEEN CASES

Author	1932 Jager IV	1929 Nordmann u. Reuys	1926 Cserna	1927 D. Lewis	1928 Lemann	1931 Ackman	1932 Norpoth	1933 Livingston	1927? Oppel
Disease duration	31-42	41	20-36	40-47	55	39-46 Not reported as T.A.O.	37-44	31-36	
Toes, left Feet Leg, right	Obliterated Obliterated	Amputated Amputated		[no pulse] [no pulse]	Amputated Amputated	Diagnosed Chicago & Montreal; 3 toes amp.; ant. tib. fibrous	Foot amputated Foot amputated	No pulse d. p. a. amput.	
Femoral, left Artery, right	Obliterated Obliterated	Oblit.; profunda thickened	Org. thrombus Org. thrombus				Occlusion	Org. thrombus	Thrombosis
Iliac, left Artery, right	Thrombus Thrombus	Thrombus Thrombus	 Org. thrombus	Occlusion old org. Occlusion		Almost occluded	Occlusion?		Thrombosis
Aorta, abdominal Aorta, thoracic	Thrombus	Sl. senile arterio-sclerosis	Insular sclerosis	Old org. celiac axis to bifurcation. (Oblit.)	Arteriosclerosis	Ulc. calc. mural. thromb.	Old and recent inflammation		Thrombosis
Arms, left right		Radial. oblit. rt.	Occlud. radial	Subslav., ax., and brachial		Arteriosclerosis		Right index finger	
Carotid and basal arteries	Oblit. and thrombus		Org. thrombus	Rt. carotid and basal arteries: org. thrombus		Arteriosclerosis carotid		Thrombus left mid cere. art.	
Brain	Scars Hemorrhage	Scars of softening	Softening	[Hemipl. death]		[Not exam.]		Softening	
Coronaries		Narrowed	Fibr. occlusion		Occlusion Calc. plaque	Mod. sclerosis		Old thrombus	
Myocardium		Scars	Scars					Large scar left ventricle	
Renal arteries	Oblit. Thrombus	Both sides oblit-erated				Right partly occluded		Changes arcuate art.	
Kidney	Infarcts and scars	Infarcts and scars	Infarct			Right large old infarct		Old scars left kidney	
Celiac artery				Recent thrombus		Orifice small			
Spleen	Oblit. branch Infarct scar	Infarcts	Infarct		Hemorrhagic infarcts				
Stomach	Scar		[Abd. pain]			[Clin. ulcer]	[Clin. diag.] Duod. scars		
A. mes. sup.	Oblit. and thrombus					Old and recent thrombus	Old occlusion		Thrombosis
A. spermat.	Oblit. and thrombus								
Lung	Scars (inf.)		Hypostatic b. pneumonia				occlu. small art., lungs & liver		
Intestines						Op. for gang. app. hem. infarct sm. intestine	Perf. ulcers small intestines		Hem. infarct intestine

There is evidence that spastic phenomena can occur in the visceral arteries, notably in the coronary arteries and in the mesenteric arteries, with the production of temporary and recurring symptoms. This may be of considerable diagnostic importance in view of the fact that these arteries may be grossly diseased and in the course of time completely obstructed without the production of infarctions. There is, in this disease, very definitely a race between the thrombotic occlusive process and the development of adequate collateral channels. The occluding process may be so slow and the development of the collateral circulation so efficient that important arteries may be entirely occluded without evidence of marked ischemia. This is well shown in the case reported by Lewis, a man 47 years of age, with thrombo-angiitis of seven years' duration, with no important history except the involvement of all four extremities in this disease. While under observation in the hospital there was a sudden stroke with hemiplegia and death. At the autopsy, in addition to the occlusion in the peripheral vessels and thrombosis of the cerebral arteries, there was found an old, organized and partially canalized thrombus that totally occluded the abdominal aorta from the level of the celiac axis all the way to the bifurcation. The celiac axis was blocked by a comparatively fresh thrombus. The beginnings of the common iliac arteries were occluded by old, organized thrombi, and also the second portion of the right subclavian artery, the axillary and brachial arteries, the right external carotid and the right internal carotid arteries.

Most studies of arterial occlusion indicate that collateral circulation and free anastomosis develop in inverse proportion to the extent and rapidity of the vascular occlusion. Fortunately, the occlusion in thrombo-angiitis obliterans is usually slow.

CONCLUSIONS

The data from 18 reported cases of thrombo-angiitis obliterans with autopsy are summarized. They indicate that thrombo-angiitis is a widespread arterial disease and is not confined to the arteries of the extremities.

There is the further indication that patients with this disease usually die of some vascular complication.

REFERENCES

Ackman, F. D.: Occlusion of the Mesenteric Arteries. Canad. Med. Ass'n. Jour., 25:657, 1931.

Barron, M. E.; and Linenthal, H.: Thrombo-Angiitis Obliterans: General Distribution of the Disease. Arch. Surg., 19:735, 1929.

Cserna, S.: Arteritis obliterans mit analogen Veranderungen in den Venen. Arch. f. inn. Med., 12:213, 1926.

Idelson, H.: Ueber die Claudicatio intermittens und deren Beziehungen zu Allgemeiner Krankungen nebst pathologisch-anatomischen Untersuchungen. Deutsche Ztschr. f. Nervenheilkunde, 80:318, 1923-24.

Jager, E.: Zur pathologischen Anatomie der Thrombo-angiitis obliterans bei juveniler Extremitatengangran. Virchow's Arch. f. path. Anat., 284:526, 1932.

Lemann, I. I.: Coronary Occlusion in Buerger's Disease (Thrombo-angiitis Obliterans). Amer. Jour. Med. Sci., 176: 807, 1928.

Lewis, D.: Spontaneous Gangrene of the Extremities. Arch. Surg., 15:613, Oct., 1927.

Livingston, W. K.: Skin Temperature Studies III. Case Report. Thrombosis of Arteries of Extremities, Brain, Heart and Kidney, with a General Discussion of Vascular Disease. West. Jour. Surg., Obst. & Gyn., 41:21, Jan., 1933.

Norpoth, L.: Thrombo-angiitis obliterans mit Beteiligung der Abdominalgefasse. Munch. med. Wchnschr., 79:1470-1472, Sept. 9, 1932.

Oppel, V. A.: Gangrene spontanee et surrenalectomie. Lyon chir., 14:1, Jan.-Feb., 1927.

Perla, D.: An Analysis of 41 Cases of Thrombo-angiitis Obliterans, with a Report of a Case Involving the Coronaries and the Aorta. Surg., Gynec. & Obst., 41:21, July, 1925.

Sprunt, T. P.: A Case of Thrombo-angiitis Obliterans with Features Suggesting an Involvement of the Mesenteric Vessels. Med. Clin. N. Amer., 16:1163-1183, March, 1933.

Taube, N.: Mesenteric Involvement in Buerger's Disease (Thrombo-angiitis Obliterans); Report of Two Cases. J.A.M.A., 96:1469, 1931.

DISCUSSION (*Abstract*)

Dr. Wm. B. Porter, Richmond, Va.—Dr. Sprunt has presented an interesting concept of thrombo-angiitis obliterans, suggesting that the disease is probably a general one with widespread distribution of the lesion. It is entirely possible that this may be true in a small percentage of those individuals who have the disease for a prolonged period. Yet from a clinical standpoint the major problem is concerned with the protection of the extremities and the prevention of serious ischemic lesions, particularly those involving the feet. The pathologic studies which have been made on this disease are, as he states, incomplete; nevertheless, we have not been impressed with the widespread distribution of the lesions and in personal conversation with several pathologists with wide experience they, too, have not been impressed with vascular lesions except in the extremities.

One is impressed with the peculiar distribution of both organic and functional disturbances of the blood vessels. Hypertension is undoubtedly a primary spasm of a widespread distribution involving the afferent arterioles throughout the body, whereas Reynaud's disease is a very localized process confined exclusively to the extremities. Syphilis predilects the large arterial trunks and the blood vessels of the somatic systems. Periarthritis nodosa is confined almost entirely to the coronary, cerebral and mesentery vessels, and arteriosclerosis may be peculiarly localized in its distribution, being confined almost entirely to the cerebral or coronary vessels. It is therefore not unusual for Buerger's disease to select the vessels of the extremities. The microscopical pathology is equally selective. Syphilis tends to involve the media, an elastic tissue, peri-arthritis nodosa the media and adventitia, and Buerger's disease the intima together with an involvement of the veins in 30 per cent of cases.

Dr. Sprunt, in his discussion of the therapy of this serious malady, mentioned the use of ligation of the major arterial trunks supplying the affected part. I feel this is an illogical suggestion, and in my own ex-

perience, which has consisted of three instances, the procedure has resulted in prompt and extensive gangrene.

The question which has been raised by Dr. Sprunt's paper is an interesting one and can be settled only by careful autopsy studies; until this has been done I feel that we should continue to emphasize the lesion involving the extremities and not concern ourselves particularly with those which involve the coronary and other internal arteries.

Dr. Harry C. Schmeisser, Memphis, Tenn.—Thrombo-angiitis obliterans (Buerger's disease) has been considered an inflammation of unknown etiology involving principally arteries and to a less degree the associated veins of the lower extremities, characterized by congestion of the vasa vasorum and immigration of polymorphonuclear leukocytes, lymphocytes and large mononuclear leukocytes and the passage of serum into the vessel wall. This is followed by the formation of a thrombus within the vessel lumen which causes its gradual occlusion and decrease of blood to the tissue supplied. This anemia increases until, in time, gangrene of toes, foot, and so on results. Organization and recanalization of the thrombus may occur, but the new canals are usually too slow in forming and too incomplete to reestablish sufficient circulation to save the parts from gangrene and an amputation is usually necessary.

Dr. Sprunt brings strong evidence that this is a general vascular disease. I have for some time entertained this possibility. The infective agent seems to reach the vessel wall by means of the vasa vasorum, which would suggest that it is in the general circulation and capable of reaching all vessels of the body. We know that the inflammation progresses along the vessel wall and appears in different vessels, not only on the same leg, but the other leg also. Why should this infectious disease of vessels be limited to the lower extremities?

Dr. Louise M. Ingersoll, Asheville, N. C.—In a recent issue of the *Health Examiner*, a monthly bulletin published by the New York Academy of Medicine, a writer suggests that thrombo-angiitis obliterans may be an allergy. He states that practically all of a large series of cases were in tobacco users and that the majority of patients gave a positive skin test to tobacco. I should like to ask Dr. Sprunt what his opinion is of this possibility.

Dr. Sprunt (closing).—Thrombo-angiitis is, of course, from a clinical standpoint, essentially a peripheral vascular disease. If, however, we can take the available autopsy evidence as indicative of the behavior of the disease in general, we must recognize the apparent fact that at least in its late stage the disease may be a widespread one. In each case we should keep in mind the possibility of the development of clinical signs of involvement of arteries in other domains.

The work of New York investigators on allergic reactions to tobacco products in these patients is very interesting. This work has not yet been widely confirmed. Certainly it would seem that tobacco cannot be the only cause of thrombo-angiitis, for many of these patients are mild smokers and some of them have never used tobacco.

TRAUMATIC ARTERIOVENOUS ANEURYSM*

REPORT OF A CASE INVOLVING THE POSTERIOR TIBIAL VESSELS OF BOTH LEGS, WITH A SUMMARY DISCUSSION OF THE LITERATURE ON ARTERIOVENOUS ANEURYSM

By W. H. PARSONS, M.D., F.A.C.S.,
and
W. G. WESTON, M.D.,
Vicksburg, Mississippi

"Any abnormal communication between normal arteries and veins or venous channels without the interposition of the capillary bed, whether congenital or acquired, constitutes an arteriovenous fistula. This definition excludes the terminal communication which exists between normal terminal arteries and veins in the erectile organs of the male and female generative tract and elsewhere, in which an intervasal communication is established through intermediary lacunar or cavernous spaces" (Matas[1]).

There is every justification for the classification of all the arteriovenous fistulae under the generic term of aneurysm. It is probable that the reason why a number of contemporary writers prefer to term these arteriovenous communications "arteriovenous fistulae" instead of "arteriovenous aneurysms" is that the concept of aneurysm presupposes a circumscribed tumor or sac which is often not recognizable in the simple direct fistulae; but these are none the less aneurysms. If the word fistula is to be used in any distinctive sense, it should be restricted to the simple, direct and sacless anastomoses.

On the other hand, in recognizing the arteriovenous character of the cirsoid, racemose, plexiform aneurysms and the angiomas of the mixed arteriovenous type, whether congenital or acquired, we should not lose sight of their distinctive histopathogenetic and clinical type, which gives them an individuality that fully justifies their separate place as neoplasms in the aneurysmal family.

If the morphology and pathologic anatomy of mature and fully established arteriovenous aneurysms were studied more closely, it would probably be possible to differentiate fifteen different types. Practically, however, they can be divided into two groups, the direct, or varix, and the indirect, or varicose forms. Callander[2] has given the following classification:

(1) Aneurysmal varix.

---

*Read in Section on Surgery, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

*Abstracted. Complete paper may be obtained from authors in the reprint.

(2) Varicose aneurysm by dilation, when the vein increases in size and dilates into a circumscribed swelling. This, apparently, is merely a subclassification of 1, in which time is the factor.

(3) Encysted varicose aneurysm.

(4) Intermediate encysted varicose aneurysm.

(5) Arterio-bi-venous aneurysm, in cases where an artery communicates with two veins.

There is much that could be said in criticism of this classification that would involve too much discussion, especially for a brief summary of this character.

In addition to the ordinary classification of varix and varicose types, a third type is sometimes mentioned. This is seen rarely, and found when a previously existing aneurysm ruptures into a vein.

Osler[3] gives an interesting historical survey of vascular surgery, referring to Rufus of Ephesus as the person who first mentioned the possibility of traumatic aneurysm. For the more recent history of vascular surgery, we are indebted to an article by Matas[4] and those particularly interested in this aspect of the subject I refer to those two contributions.

Etiologically, arteriovenous aneurysms may be divided into two great groups: the congenital and the acquired.

Dandy[5] states that arteriovenous aneurysms of the brain are always congenital, as the formation in the acquired type is dependent upon the contiguity of an artery and vein. While this anatomically is common in other regions of the body, in the brain the larger veins and arteries run independently after embryonic life.

In the acquired type, trauma from various agents is the factor of prime importance. One of the more common causes before modern warfare and the advent of the high-velocity, hard-jacketed bullet of small caliber, and while phlebotomy was commonly practiced, was venesection. Even as late as 1888, Delbet's[2] statistics of two hundred fifty cases of arteriovenous aneurysm show that in ninety-six (38.4 per cent) the ulnar artery was involved as a result of venesection. Projectiles and stab wounds have, however, replaced venesection as the principal cause.

Callander[2] reported a series of four hundred and forty-seven cases from various authors in which three hundred and eighty-three (85.7 per cent) were due to trauma, such as projectiles, knife wounds, contusions, fractures, and so on.

As a result of an abnormal arteriovenous communication, there are frequently changes in the general circulation and in the heart itself. The increased venous pressure extends from the lesion to the heart and may thus cause stasis in the liver, kidneys and spleen. In cases of long duration, particularly those of the larger vessels with a free communication, there frequently is found cardiac insufficiency with decompensation. Ultimately death follows unless relief is obtained by operation.

That the heart is enlarged in established arteriovenous fistula is universally recognized. The cause of this enlargement, whether a hypertrophy or a dilatation of the heart as a whole, or of the right or left heart primarily, has been made the subject of much discussion and experimentation. In brief, however, it may be said that all the evidence, experimental, clinical and anatomical, explains the cardiac enlargement by a primary dilatation with a preponderance of the right ventricle, followed by hypertrophy which, in advanced cases, involves the heart as a whole. In the opinion of Matas,[4] the experimental evidence furnished by Mont Reid[6] and Emil Holman,[7] in this country alone, is quite conclusive on this point, and his own study of postmortem specimens likewise fully confirms the hypertrophic nature of the enlargement.

The acquired type of arteriovenous aneurysm may occur at any point where an artery and vein parallel or have contact with each other. The most common sites are in the extremities, as there they are most frequently subjected to trauma.

The congenital type may occur at any place. The arteriovenous aneurysm of the brain is always considered congenital since, in this structure, artery and vein after embryonic life do not parallel each other.

In the acquired cases, there is usually a history of trauma. Often the patient discovers the thrill, which is invariably present, and consults a physician because of this. Large, dilated veins of an extremity may serve to draw attention to this condition and the presence of varicosities of a single extremity, with or without edema and decreased temperature, especially with a history of injury, should at once suggest the possibility of arteriovenous aneurysm, and the diagnosis should be confirmed or disproved by a thorough examination.

The symptoms complained of by the patient vary with the duration, size and location of the lesion. A characteristic and diagnostic sign is a marked thrill, felt with maximum intensity di-

rectly over the site of the communication, but with less intensity for some distance above and below the lesion. The thrill is continuous throughout the cardiac cycle and is often of marked intensity.

Auscultation will show a marked bruit, generally continuous, with systolic intensification, and transmitted for a considerable distance, but heard with greatest intensity over the site of the lesion. Blood pressure findings will show a greater elevation above and at the site of the fistula than below it.

Another sign, first described in America by Branham[8] of Georgia, and known as Branham's bradycardiac phenomenon, is a marked slowing of the pulse upon compression and obliteration of the communication. This sign is one of the most conspicuous features of the physiopathology of arteriovenous aneurysm and great credit is due to Dr. Branham, a modest unpretentious practitioner in Georgia, for positively and independently directing our attention to this capital sign, a sign which, despite its constant and striking character, had escaped the observation of the most eminent clinicians and surgeons who had written with the greatest experience and authority before him. It is in recognition of Branham's distinguished merit that Matas always refers in his lectures and writings to the bradycardia of arteriovenous aneurysm on compression, as Branham's sign or syndrome.

The prognosis of arteriovenous aneurysm is uncertain, and in general is dependent upon the size and location of the lesion. Abnormal communications between an artery and vein of the lower extremity give, other considerations being equal, a graver prognosis than those of the upper extremity. Either the congenital or acquired type may exist for some time without causing death. Complications that may arise are spontaneous rupture, elephantiasis of the involved extremity, ulceration due to the poor circulation distal to the lesion, cardiac hypertrophy and later insufficiency of the myocardium. Embolism may also occur in some cases.

The treatment of this condition may be divided into the non-operative and the operative. Comparatively little need be said of, and less for, the former.

In an excellent paper by Callander, various non-operative maneuvers previously and occasionally still employed are discussed, such as the injection of coagulating fluid, galvano puncture, repeated venesection with reduction of fluid intake, and direct and indirect compression.

It is now generally conceded that either no treatment should be employed or that operation ought to be done. Many surgical procedures have been utilized, among which may be enumerated the operation of Antyllus, the ligation of Anel, double arterial ligation, Hunterian ligation, quadruple ligation, quadruple ligation and excision, ligation of the communication between the artery and vein, detachment of the anastomosis and separate closure of the artery and the vein by lateral suturing, end-to-end suture of one or both vessels, transvenous closure of the fistula and intrasaccular suture in the varicose type of communication.

Ligation of the communication between the artery and vein, unfortunately, cannot often be accomplished and even though possible of performance offers certain objections. Successful cases, however, have been reported.

Detachment of the anastomosis and separate closure of the artery and vein by lateral suturing, where it is possible, represent the ideal procedure. Exclusive of the cases incident to army service, and until 1917, this had been attempted on ten occasions and cure had resulted in eight, death following in two.

The German surgeons, as typified by Lexer, have strongly advocated and fostered the procedure of end-to-end suture of one or both vessels. In contrast, the ultra-radical group typified by the French surgeon, Delbet, advocate extirpation of the sac with its vascular contents and ligature of the four stumps. The middle ground is occupied by the British and Japanese surgeons, who probably do far less damage to the perivascular tissues by leaving the sac, but unnecessarily complicate their technic by dissecting out the main vessels and the collaterals, in order to close them by quadruple ligatures.

In 1903, Matas[9] first described the endoaneurysmal method of suture, but made no specific mention of its adaptation to the closure of arteriovenous fistulae. In the succeeding year Bickham[10] suggested that the communication in aneurysmal varix be closed through approach by the transvenous route, and he designated this procedure as the Matas-Bickham operation. The first case was done by Gessner[11] and reported by him in 1907, since which time numerous successful case reports have appeared. Lecene,[12] who had previously expressed no liking for the method, later successfully employed and frankly praised it. One will find, on reviewing the records of the World War, that the aneurysmal method of treating arteriovenous

aneurysm by the intrasaccular suture of the communicating orifice by the transvenous route is received with favor by Sir George Makins,[13] who, without mention of the work done many years before by Matas, Bickham and others, blandly concludes that

"a far preferable [to quadruple ligation and excision] method of treatment of aneurysmal varix is to close the communicating opening by suture, as has already been described under the heading of arteriovenous aneurysm. If a direct opening exists between the artery and vein, the latter should be opened freely. The communication is then exposed and may often be stitched up without any further preparation. If the sac be situated between the vessels, it should be opened fully and the communication can be stitched from this point."

Makins[13] further elaborates upon and recommends the method devised by Matas sixteen years before, without at any point intimating the slightest familiarity with previous papers of Matas and others. In this respect, he assumes what, were he of different nationality, generous Sir Berkeley Moynihan would term the

"quaint Gallic frugality of recognition for the work of others and for surgeons in other countries."

Unless one proposes to do the operation of excision with restoration of continuity of the vascular trunks by end-to-end suture, operation had best be postponed until sufficient time has elapsed for the development of the collateral circulation, and it is obvious that if end-to-end suture cannot be done and the collaterals have not developed, the effects might well be disastrous. Postponement of operation may result in spontaneous cure. This happy ending, while not common, is possible, and if it is to occur, will generally take place within six months from the time of the original injury, although spontaneous healing has happened after many years. Delay in the performance of operation has, however, a more laudable purpose in that it permits development of the collateral circulation, a matter of prime importance, and it makes simpler the technical dissection of the vessels and less probable the occurrence of infection. For these reasons, therefore, surgery should be delayed for a period of three to six months, or until such time as examination shows the optimal moment for intervention has arrived. Certain circumstances, however, it must be admitted, may demand immediate operation, in which event the risk incident thereto must be assumed.

While waiting, the institution of rest is advisable. Massage has often been employed, but it is not without danger. The collaterals may be trained by vascular gymnastics with systemic and regional treatment. Reid[14] feels that if a direct attack on the fistula is contemplated such training is unnecessary. Here, as elsewhere, fundamental principles of surgery cannot safely be disregarded; therefore operation ought not to be done on the patient badly shocked, exhausted or exsanguinated.

One should operate when it is clearly shown that the circulation of the peripheral tissues is maintained after occlusion of the main vessel.

The efficiency of the collateral circulation must always be determined. To accomplish this result, several tests have been described, and will not be further discussed here, except to say that the new methods of arterio- or angiography with radiopaque substances should be considered as especially worthy of attention since the introduction of thorium dioxide ("thorotrast") as the safest opaque medium. But the danger of peripheral spasm and of exciting endothelial reactions with thrombosis following these injections are to be considered seriously, at least in the present state of experience. The risk of complicating a favorable case is out of proportion to the benefit that may be derived from the test.

The calorimetric or thermometric test by the help of a thermocouple to determine the difference in the surface temperature before and during compression may be used. This method requires, however, a very careful observance of certain conditions of the circulation and of the room temperature to avoid erroneous conclusions and is also liable to fallacies due to disturbance in the vasomotor control which impairs its infallibility. It is valuable as an auxiliary test only.

Not one test, but all the available tests, calorimetric, oscillometric and thermometric, should be done and the clinical study of the circulation of the limb by the conjoint results of the application of all these should determine our judgment of the efficiency of the collateral circulation.

The fact is obvious that cure of anteriovenous aneurysm is only possible if the communicating channel is suppressed. This end, irrespective of the means used toward its attainment, is absolutely essential if success is to follow. Some type of conservative operation ought, if feasible, be done, but should never be attempted unless one can be absolutely certain of prophylactic hemostasis. It is of course apparent that hopelessly damaged vessels cannot be repaired and it is not conservative to attempt the restorative operation in this type of case. The choice of method should depend on the conditions en-

countered at the time operation is done. It is impossible to decide beforehand precisely what technic will be employed. It is desirable to restore the continuity of the vessels, but if this is impossible, or in an emergency, or in dealing with the smaller vessels, the operation of quadruple ligature, with excision, has been, is now and will in all probability remain, the operation of choice.

"In the presence of insurmountable and forbidding anatomical and pathological conditions, the conservative principles of suture must yield to the radical methods of ligation and extirpation, which are, under these circumstances, to be regarded as truly conservative whenever they accomplish cure without the sacrifice of life or limb" (Matas[15]).

It is true, however, that radical operations are probably often performed unnecessarily.

In recent years, preventive and therapeutic venous occlusion has been given much consideration. As a matter of fact, the history of this procedure is apparently quite ancient. According to Matas,[1] it goes back to 1816, when the distinguished Russian surgeon, W. P. Pelikan, first suggested it in an essay on aneurysm ("De Aneurismate") published at that time. The late Professor von Oppel, of Leningrad, in quoting Pelikan, says that after a silence of one hundred years he (von Oppel) rescued Pelikan's suggestion in 1916, and has been a consistent advocate of it ever since. Independently of Pelikan or von Oppel, Antonio Ceci, of Pisa, advocated the simultaneous ligation of the internal jugular vein in all cases requiring the ligation of the common or internal carotid in 1904. A number of Ceci's Italian colleagues took up the idea and applied it in their practice and Gaetano, of Naples, in October, 1905, extended this bivasal practice to the ligation of the femoral artery. But it was not until the outbreak of the World War that Pelikan's forgotten suggestion was resurrected by von Oppel in Russia, Makins in England, and Tuffier in France. But it is chiefly to the influence of Sir George Makins' great authority that the large stream of the experimental and clinical literature has sprung up in America and in the English-speaking countries.

There has therefore developed a widespread and, until recently unquestioned belief, that if the main artery of the limb should be suddenly occluded as occurs by necessary ligation, then ligation of the main accompanying vein lessens the chances of subsequent development of gangrene. The work of Brooks and Martin[16] has furnished the main experimental support of this view and Holman and Edwards[17] elaborated further upon their experiments and claimed that venous ligation at a higher level than the arterial, still further reduced the incidence of gangrene. Although the precise mechanism whereby this unhappy sequel was avoided or made less likely remained a matter of dispute, the favorable results of simultaneous venous ligation appear to have been universally accepted.

Reid, Pemberton[18] and others have concurred in the views formerly expressed by Brooks. The latter author, however, has taken occasion to caution that at times the procedure of simultaneous ligature is inadvisable, in that the remote effects of therapeutic venous obstruction must be considered and that we must balance the desirable result that gangrene might be averted by the procedure, against certain undesirable sequelae, such as subsequent venous stasis which may be provoked with resultant protracted edema and swelling of the limb. Pemberton, in a recent article, remarked that there is abundant clinical evidence to support the admonition of Brooks against indiscriminate ligation of the concomitant vein in all cases of obstruction of the artery. Pemberton concludes that in cases of inadequate collateral circulation, ligation of the vein at the time of ligation of its companion artery is advisable, but that it should not be done in cases presenting an adequate collateral circulation for the reason previously given by Brooks.

Before arriving at the decision that in the event an artery is tied, ligation of the vein is wise, it would be well to consider the latest contribution, offered by W. P. Wilson[19] on this subject.

Wilson, after a large series of adequately controlled experiments, concludes

"that the results of the investigation are not in accord with previous experimental work on the subject. They do not support the current belief that the ligation of the main vein diminishes the incidence of gangrene which follows the ligation of the main artery."

He (Wilson) states also "that ligation of the vein at a higher level than arterial ligation increases the incidence and extent of tissue death," and he holds that the "theories previously held to account for the supposed benefits of venous ligation have not withstood experimental trial."

Matas says that in his clinical experience and that of others he has never seen a case of impending gangrene of a limb due to ischemia from any cause saved by the mere ligation of the satellite or main vein. Matas feels that convincing evidence has never been offered of the saving value of the venous ligation; and on

the contrary he remarks that the literature is full of instances in which simultaneous ligation of the main artery and vein in the limbs, especially the lower limbs (common, femoral and popliteal) gangrene occurred despite the double ligation. The fact that gangrene does not follow a ligature of artery and vein does not mean that the ligature of the vein as a mere mechanical obstacle prevented the gangrene. Nor does Matas believe that the simultaneous ligation of the carotid artery and the jugular vein exercises any positive or dependable prophylactic influence against cerebral disturbances, and he (Matas) finally concludes that his entire clinical experience and study of the subject support Wilson's conclusion.

CASE REPORT

The patient, a white man twenty-eight years of age, registered at the Vicksburg Hospital on August 26, 1932, and was referred to us by Dr. I. C. Knox. The history was that two months previously a gunshot wound involving both feet and legs was sustained. It appeared that the patient while prowling about a chicken farm was shot by the irate owner, who on previous occasions had suffered loss from such visits and had accordingly provided himself with a shotgun loaded with bird shot. A single charge was fired from a distance of approximately fifty feet, the shot striking the patient in both legs and feet. Immediately following the injury there was considerable bleeding from both legs, particularly the right. Marked pain was also suffered and for nine days the patient was confined to bed. Slight bleeding from both legs, most marked from the right, continued for several days and following the institution of ambulatory treatment pain and soreness in the right foot and ankle persisted. The wound of the right ankle refused to heal. Swelling of that part developed, and became gradually more marked, as did the pain. No particular difficulty was encountered from the wound of the left leg. Until five days before presenting himself to us the patient had been able to walk, but at that time the pain became so severe that no weight could be borne on the right foot and opiates had been necessary to obtain relief. The chief complaint at the time of admission was violent pain and soreness in the right foot and ankle.

The family and past personal histories, insofar as the present injury was concerned, were irrelevant, except that the patient had been examined elsewhere and found to have syphilis. For this malady, several injections of neoarsphenamine had been given without demonstrable effect either upon the wound present in the right lower extremity or upon the pain.

The physical examination, except of the lower extremities, showed nothing of remarkable interest. The patient was quite emaciated. The pulse rate was 96, the blood pressure, systolic 114, diastolic 70. The heart outline was within normal limits to percussion, the rhythm was regular and there were no murmurs present.

Examination of Lower Extremities.—The right leg revealed considerable atrophy of the muscles, due apparently to non-use. There was moderate induration of the right foot, extending from the base of the toes to one and one-half inches above the ankle joint. This area was somewhat darker than normal tissue. It pitted and blanched on pressure. There was considerable tenderness on pressure over this area, and particularly on attempted movement of the right ankle joint. The discoloration did not disappear when the foot was changed from the dependent to the horizontal position. Just above the lateral malleolus there was a chronic, draining, ulcerated area about the size of a dime, with indurated edges. Extending over the right leg, from the ankle to six inches above, were numerous pigmented areas denoting the points of entrance of shot. These points were scattered about over the entire leg. On palpation of the right leg, a marked thrill was felt five inches above and posterior to the ankle joint. This thrill was felt over a considerable area both above and below the point of maximum intensity and was continuous. It was palpable around practically the entire leg, but felt with less intensity over the tibia on the medial surface. On auscultation, a bruit was heard over the same area. It was heard about the entire leg at the level of the maximum intensity of the thrill, except immediately over the anterior tibia where it could barely be distinguished. Examination of the right thigh revealed a markedly enlarged inguinal lymphatic gland, about one inch in diameter, which was tender to palpation.

Left Leg.—Scattered over the left leg, from the ankle joint to approximately six inches above the joint, were pigmented areas denoting the points of entrance of shot. The left leg otherwise revealed no abnormality on inspection. On palpation, there was a marked thrill five inches above the ankle joint, its maximum intensity extending around the leg, and for several inches above and below this level, being of least intensity over the tibia. A bruit was heard on auscultation. The thrill and bruit were present continuously.

Clinical Impression.—(1) Chronic osteomyelitis of right foot and ankle.

(2) Bilateral arteriovenous aneurysm, the communication being of the posterior tibial vessels.

(3) Syphilis.

X-ray examination showed numerous small shot scattered throughout the soft tissues and bony structures of both legs.

Laboratory studies, except for a strongly positive Wassermann, were essentially negative.

The patient was hospitalized and on August 27, through the usual incision, the posterior tibial vessels of the right leg were exposed. A communication between the posterior tibial artery and vein, the communication being of the varix type and situated at the lower third of the leg, was demonstrated. Quadruple ligation and excision were done. Immediately all evidence of the fistula disappeared. The wound was closed in the usual manner and recovery from operation until the tenth day was uneventful. On September 6 a sudden, most profuse hemorrhage occurred from the wound and it was necessary entirely to reopen the incision, whereupon it was found that ligatures placed on the decidedly enlarged proximal stump of the tibial artery had slipped. The bleeding was controlled and a small Penrose drain was placed in the depths of the wound, which was then closed. Healing was decidedly delayed, but did ultimately occur.

On September 15, through the usual incision, the left posterior tibial vessels were exposed at the lower third

and fistula of the varix type was demonstrated. The artery proximal to the communication was decidedly enlarged. Quadruple ligation was done and the communication was excised. The thrill and bruit ceased. The wound was closed in the usual manner. Recovery from the operation was prompt, as was healing. The sutures were removed at the usual time and no further difficulty was experienced with the left leg.

It became obvious that the nerve in the right leg had been damaged. Swelling was seen for a long period of time, but the ulcer formerly present on the right lower extremity healed with amazing rapidity and immediately following operation there was relief from pain.

Five months following the first operation, the patient was working as an automobile mechanic. No further difficulty had been experienced with the left leg, there had been no recurrence of the draining sinus originally present on the right leg, all of the wounds had healed, but occasional swelling of the right foot still occurred.

CONCLUSION

We have exhausted all of the available sources of information at our command without discovering another case exactly parallel to that just reported.

Matas, in a personal communication, says that there came under his care a case of multiple small arteriovenous aneurysms of the vessels of the forearm, caused by the accidental peppering of the arm with a load of bird shot. There were in this case (a hunting accident) at least ten or twelve small arteriovenous aneurysms between the radial and ulna arteries and veins below the elbow. The aneurysms were all small, but the hum and buzz and thrill could be felt and heard all over the forearm and up the arm to the axilla and subclavian regions. The patient, a young negro eighteen years of age, was exhibited by Dr. Matas at his clinic in the Charity Hospital. The boy seemed to suffer very little inconvenience apart from the turgidity of the superficial veins. He later disappeared and could not be traced for follow-up report or treatment.

There are on record many cases of multiple pathogenic aneurysms, but except for the one just referred to, and the case which we report, we have found no mention of other cases of multiple traumatic arteriovenous aneurysms.

A report of the individual experience of the military surgeons of the Balkan and World Wars reveals no cases. Possibly when the reports of the Japanese and Chinese surgeons in the present war are published, their records will show, in addition to the multiple injuries caused by land forces, many more casualties of this sort as the result of the explosive bombing by air forces. It appears, however, that this accident must be very rare, both in civilian and military practice.*

BIBLIOGRAPHY

1. Matas, Rudolph: Personal communication to the author.
2. Callander, C. L.: Study of Arteriovenous Fistula with an Analysis of 447 Cases. Ann. Surg., **71**:428, 1920.
2. Delbet: Quoted by Callander.[2]
3. Osler, Sir Wm.: Remarks on Arteriovenous Aneurysm. Lancet, **1**:949, 1915.
4. Matas, Rudolph: Some Experiences and Observations in the Treatment of Arteriovenous Aneurysms by the Intrasaccular Method of Suture (Endoaneurysmorrhaphy) with Special Reference to the Transvenous Route. Ann. Surg., **71**:403, 1920.
5. Dandy, W. E.: Arteriovenous Aneurysm of the Brain. Arch. Surg., **17**:190, 1928.
6. Reid, Mont R.: Abnormal Arteriovenous Communications Acquired and Congenital. Arch. Surg., **10**:601, March, 1925.
7. Harrison, Tinsley R.; Dock, William; and Holman, Emil: Experimental Studies in Arteriovenous Fistula Cardiac Output. Heart, **11**:337, Dec. 29, 1924.
8. Branham, Harris M.: Jour. Med. Assn. Ga., Jan., 1924.
9. Matas, Rudolph: Ann. Surg., Feb., 1909.
10. Bickham, Warren S.: Ann. Surg., May, 1904.
11. Gessner, H. B.: New Orleans Med. & Surg. Jour., **60**:553-556, 1907-8.
12. LeCene, C. P.: Bull. Acad. de Med., Paris, No. 31, Aug. 7, 1917.
13. Makins, Sir George: The Gunshot Wounds of the Blood Vessels, p. 86. London and New York, 1919.
14. Reid, Mont R.: A Report of Vascular Lesions. Amer. Jour. Surg., p. 39, Oct., 1931.
15. Matas, Rudolph: Surg. Clin. N. Amer., **2**:1165-1187, Oct., 1924.
16. Brooks, B.; and Martin, K. A.: J.A.M.A., **43**:678, 1923.
17. Holman, E.; and Edwards, M. E.: J.A.M.A., **28**:909, 1927.
18. Pemberton, J.; and McCaughan, J. M.: Traumatic Lesions of Arteries. Ann. Surg., ——:1103, Dec. 1, 1932.
19. Wilson, W. C.: Occlusion of the Main Artery and Main Vein of a Limb. Brit. Jour. Surg., Jan., 1933.

DISCUSSION (*Abstract*)

Dr. G. Paul LaRoque, Richmond, Va.—The case reported is another illustration of the great importance and potential seriousness of gunshot injury of the leg, every case of which calls for painstaking examination for injuries of blood vessels as well as of the bone and soft parts.

It is quite likely that some of the cases of shotgun injury of the leg have been followed by amputation because of gangrene which might not have occurred as a result of the injury and infection of the soft parts *per se*. An important factor is also infection of the artery, the wound of which might have been detected at the time of or very soon after the initial examination.

In the absence of serious infection of a wound of the posterior tibial artery and vein, the case illustrates that gross gangrene is not likely to occur, at least within two months, but the crippling effects of the blood vessel injury are still incapacitating and demand operation upon the blood vessels themselves.

Concerning the general study of the whole subject of arterial venous aneurysm, which is exhaustively

*Under "Definition," "History" and elsewhere, we have quoted liberally and, in some instances, almost textually from Dr. Matas' publications and especially the notes and comments that he has kindly permitted us to use in advance of the monograph on "Aneurysm" that he has in preparation. We wish to express our appreciation for his assistance.

made by the authors, the generous willingness of Dr. Matas to take part in the discussion would render it superfluous if not audacious for anyone else to assume to take any other part than that of an attentive listener.

In dealing with injuries of large blood vessels, few surgeons have sufficient experience to permit dogmatic assertions concerning the exact details of the methods to be employed in handling all cases from start to finish. We have, therefore, not passed entirely beyond the stage of case reports in the study of the problems involved in the surgery of injuries of large blood vessels. Therefore, it behooves every surgeon to put on record detailed reports of all such cases that they may be accessible to collective investigation.

For experimental investigations in this subject the world is indebted very largely to two great American surgeons, the late Dr. W. S. Halsted, and the living Rudolph Matas, and their many pupils, numbers of whom are living now, and in the South.

I have had a personal series of twenty-one cases within the past eleven years, eighteen of which have been reported. Eleven of these involved the iliac and femoral vessels, three the popliteal, two the subclavian, three the brachial and one the radial and one the external carotid vesse's.

Congenital arteriovenous communications are extremely interesting. I have studied thoroughly three striking cases of these, one of an internal iliac in a man, one the vessels of the leg and thigh of a child, one the terminal branch of the superficial femoral vessels in a young woman.

The part played by multiple tiny arteriovenous communications in the causation of varicose veins is an attractive field for investigation. People with dilated hearts, upon whose extremities may be found a scar at the site of a bullet or stab wound in the neighborhood of a large blood vessel may show the thrill and bruit of arteriovenous communication and Branham's bradycardiac phenomenon. These hearts can be restored to normal within a few days following excision of the arteriovenous lesion. Some keen-minded general physician like Branham will some day recognize the diagnostic signs of congenital arteriovenous communication in many cases of heart disease.

Dr. Rudolph Matas, New Orleans, La.—The authors have quoted me so liberally and generously that I feel that in many particulars they have unintentionally anticipated my discussion. To avoid repetition, I will confine my remarks to the more salient features of their paper.

The case report is a valuable contribution to the casuistics of arteriovenous aneurysms. Multiple A-V aneurysms in the same individual are not rare, but bilateral aneurysms at the same level in opposite limbs caused by the same missile are certainly rare and well worthy of record. I have never seen a case of this type.

The surgical history of modern wars, especially the World War, in which explosive shells and machine gun fire preponderate as the chief causes of vascular injuries, abound in instances of multiple arteriovenous injuries scattered over the body and extremities.

In peace, the vascular wounds caused by fine bird shot or coarser ammunition are not rare in hunting accidents, and when fired at long range they are frequently spread over a large body surface.

In this way multiple injuries of the more superficial vessels of the extremities are not rare. I have in mind the case of a negro boy who was peppered with small bird shot, a considerable part of the load taking effect in one of his arms. As a result, eight or ten very small arteriovenous communications were established between the superficial veins and arteries of the forearm. They seemed to cause no serious inconvenience, but the thrill and buzz which they caused gave the impression of a network of pulsating chaplet-like beads which were separate and individualized and, in this way, differed from a cirsoid aneurysm. I was puzzled to know what I should do with this unusual condition, but before I could come to a decision the patient disappeared and I have never heard from him since.

In regard to the symptomatology of arteriovenous aneurysms, too much stress cannot be laid on the preliminary investigation of the effects of the fistulae upon the heart and cardiovascular mechanism. It is from the viewpoint of their systemic effects that the attitude of surgery towards these aneurysms has radically changed. It is only through the knowledge of these cardiovascular effects acquired in the last fifteen years that a sharp line of demarcation has been drawn between the old and the new surgery. No surgeon of the present day can avoid the obligation of a most thorough preliminary study of these effects, in well established A-V fistulae in the large vessels, without availing himself of the resources of modern cardiology to determine the prognostic as well as the diagnostic indications furnished by these aneurysms. A valuable addition to our resources in detecting the existence and seat of a fistula is offered by the method of determining the oxygen content of the blood in the regional veins, as Brown, Lennox and Horton, of the Mayo Clinic, have recently demonstrated. The blood from the emulgent veins is oxygenated and practically arterialized by an increase in its oxygen content in proportion to the proximity of the fistula. In regard to vasography, I must state that my objections to radiopaque solutions have been largely overcome by my recent experience with thorium dioxide (thorotrast), as this is practically devoid of risk when used for diagnostic purposes in peripheral aneurysms. I cannot say as much for its benignity when used to visualize the liver, spleen and kidneys, or other viscera of a preponderating reticulo-endothelial type.

In regard to treatment, I repeat and maintain that arteriovenous, as arterial aneurysms, should be approached by the surgeon in a conservative and eclectic spirit, after a most thorough preliminary study of the patient and the aneurysm, and his findings at operation. The sacrifice of the vein is of no great importance in well established A-V aneurysms, but the ideal is to restore the circulation to its normal channels while completely obliterating the fistula. In simple or direct A-V fistulae, the communicating vessels can sometimes be detached and both vessels saved; more often the vein has to be sacrificed and only the artery saved by the transvenous closure of the fistula. When both vessels are irreparably damaged the quadruple ligature, with complete section of the vessels through the fistula, is in order. Unfortunately, in gunshot cases in which the vessels are embedded in a dense cicatricial mass, the radical procedures often become a necessity; in punctured or incised wounds, or in fistulae caused

by small, sharp projectiles, the opportunities for conservatism are greater. What I object to most emphatically is a routine practice in dealing with aneurysms, whether A-V or arterial, by radical methods of extirpation and ligation without regard to the opportunities for conservatism that are frequently offered. In the peripheral aneurysms, an absolute hemostatic control of the field can be obtained that permits thorough, deliberate and safe work.

FRACTURES OF THE OS CALCIS*

By J. EDGAR STEWART, M.D.,
St. Louis, Missouri

Fractures of the os calcis are rated relatively high from the standpoint of percentage of permanent disability by industrial commissions and their medical referees. This fact will not appear unreasonable to many of us who have observed these cases through months of convalescence. The cause is also apparent from our knowledge of the physiology of the foot. A great part of the facility of the foot for weight-bearing is due to the rather intricate combination of articulations which, taken together, form a practical universal joint, allowing the weight-bearing surface to accommodate itself to all manner of irregularities in the surface to be trod on. In the typical fracture of the os calcis one or more fracture lines extend into the superior articular facets. Malformation of this accurately fitted joint and subsequent traumatic arthritis result so that normal lateral motions of the foot may be seriously interfered with. I believe it is generally conceded that the damage to the astragalocalcaneal articulation is the chief factor in the persistent disability in some of these cases. There are other contributing factors which permanently disturb the physiology of the foot as a weight-bearing member. The posterior portion of the os calcis forms the posterior pillar of the longitudinal arch of the foot. When it is driven upward and outward and impacted in that position, the arch is flattened and the spring which it contributes to weight-bearing is lessened or lost. In addition to this a great deal of importance is attributed by some surgeons to the buckling of the bone just under the lateral malleolus and in the region of the peroneal tendons which is frequently seen. The lateral deviation in itself offers a disturbance in weight-bearing mechanics.

Most of the changes mentioned above actually take place in the majority of cases of fracture of the os calcis and deserve the serious study and attention of surgeons, particularly those interested in industrial practice.

I had the feeling a few years ago that it was hopeless for a man with such an injury to expect to resume work that required considerable activity on foot and I was surprised when, from time to time, some of these men asked to return to their work as active railroad and industrial workers.

I determined some time ago to examine the records of the cases that had been under my supervision during the past eight years and to study their fitness to resume activities as industrial workers. The examination of thirty-six cases whose records were available is the basis for this paper.

Only cases in which the radiograms showed the typical comminuted fracture with the fracture line extending into the subastragalar joint were included in the final study. Sprain and chip fractures and fractures involving only the posterior-inferior process were excluded. It was interesting to note, however, that such fractures gave short periods of temporary disability and none had any permanent impairment of function. Radiograms of all cases were reexamined. Of the thirty-six cases, fourteen were seen and examined for foot function and were questioned about various features of their industrial rehabilitation. Those who could not return for an examination were asked to answer similar questions by letter. Sixteen of these were heard from. Most of the cases were the employes of one railroad and all of these but two were injured while working on jobs requiring the most active use of the feet. Only two had executive or clerical positions. It is assumed, therefore, that those who returned to their old jobs were fit for almost any kind of work. Six cases could not be traced for examination or questionnaire and were not considered in the study.

Of the thirty cases examined or heard from, twenty had returned to work and were working steadily at their old jobs when seen or heard from. Of the ten who had not returned, two were sixty-five years old at the time of injury and ready for retirement; one had a mid-thigh amputation of the other leg; one was confined in an insane asylum and one had sustained a crush fracture of his first lumbar vertebra and was taken out of service as a machinist's helper in the railroad shops on account of his spine injury. This man said when he reported for ex-

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

amination that he had been working at farm labor twelve hours a day for the past year and could not tell the difference in his two feet. He had been treated by the Böhler method. I examined his injured foot and found no restriction of motion whatever. Another, counted as a non-worker, was a freight conductor who had a subastragalar arthrodesis four months after injury. He received five thousand dollars from his company and five thousand dollars from his union for total permanent disability and one year after operation got a job as baggage man. He returned a few months ago stating that his foot gave no trouble, that he had spent his money and would like to return to his old job as conductor. His application was disapproved. The type of work performed by those returning to their old jobs was as follows: locomotive engineer, two; machinist, two; bridge and building carpenter, two; car repairer, one; switchman, two; boilermaker, two; brakeman, two; pipe fitter, one; locomotive fireman, two; executive, one; truck driver, one; wrecker engineer, one; school teacher, one.

The results of the examination of the feet of those who had returned to their old jobs was most interesting. All but three had restriction of lateral motion, ranging from 10 to 90 per cent. One switchman who had had a compound fracture returned to work as a switchman eighteen months after injury and has been working steadily for three years. Examination of his foot showed 90 per cent restriction of lateral and 75 per cent restriction of dorso-plantar motion. He weighs 240 pounds and must be on and off moving trains many times a day, but he says he has no pain or swelling. All but two had broadening of the heel and increased abduction of the foot compared to the uninjured side. In the examination of the feet and of the roentgenograms there was nothing in most cases to distinguish those who had pain on weight-bearing from those who had not. After examining this series of feet, I felt that I must be dealing with an unusual group of workmen or that I must revise my conception of the part played by weight-bearing position and unrestricted joint motion in the weight-bearing function of the foot.

TREATMENT

Treatment in most cases seen as fresh injuries was as follows: the injured foot was elevated eight to twelve inches above the mattress with a splint to support the sole of the foot and continuous ice bags; and after a few days it was manipulated under anesthesia with molding of the heel and the arch and the application of a plaster cast from the toes to the mid-thigh. During the past three years, manipulation and molding by Böhler's method with piano wire through the posterior process for traction has been used in a number of cases. More recently, I have also practiced the use of the non-padded walking cast as soon as swelling could be reduced sufficiently to make it practical. These measures seem to me to be an aid in restoring conformation and function at an earlier date and may shorten the convalescence. I was impressed by the fact that two of the three cases found to have free lateral motion were treated by the Böhler manipulation and the non-padded walking cast.

It was not my impression that any particular technic in treatment or any unusual results obtained accounted for the surprising percentage of cases returning to work. In fact, three of the men who resumed work in six, three and two and one-half months, respectively, received no treatment but elevation and ice packs, and left the hospital for personal reasons and against advice within two weeks of their injury. This does not lead me to believe that restoration of normal position and motion in such injuries is not the desirable mark to shoot at and a longer period of hard usage will probably show that the normal expectancy for foot usage has been materially cut down in those with subnormal function and poor weight-bearing line.

Three cases had subastragalar arthrodesis several months after injury. Of these, one returned to work six months after operation, one asked to return three years after operation and one had not returned thirteen months after operation. I considered all of these arthrodesed cases able to resume work in from six to nine months following injury and have advised this operation in several cases who have not resumed work. However, most of them received financial settlements which allowed them to retire to light work on small farms or in small towns and they did not care to undergo the operation. I consider it the only remedial measure for the case that has persistent pain and swelling on weight-bearing. Malposition and encroachment of bone on the lateral malleolus can be corrected at the time the arthrodesis is done.

215 Beaumont Building

DISCUSSION (*Abstract*)

Dr. H. Earle Conwell, Birmingham, Ala.—In comminuted fracture of the os calcis involving the subastraga-

loid joint I have used Böhler's treatment in the majority of instances with better results than with any other method. However, I do not believe that Böhler's method is indicated in every fracture of the os calcis. If there is a linear fracture extending up into the subastragaloid joint and the tuber angle has not been interfered with and no displacement is present, I cannot see any necessity for a manipulative procedure. All that is necessary in such a case is a circular cast from the base of the toes to the middle third of the thigh.

One of the most disabling factors in fractures of the os calcis is the broadening and eversion of the heel and ankle, and the development of callus beneath the external malleolus, which is not to be desired but occurs in cases treated even by the Böhler method. There is no panacea for fracture of the os calcis. Regardless of what method one uses, he will get good, bad and indifferent results.

One should try to restore the normal anatomical position of the os calcis as well as the whole foot and ankle, but one must remember that the fracture is not the only complication. In this fracture as well as in any other fracture, the soft structures, that is, muscles, nerves, blood vessels and joints must be dealt with as much as the bone. Each fracture is a law unto itself. It behooves everyone treating fractures of the os calcis (or any fracture as a matter of fact) not to become too much of a faddist and try to apply one type of treatment to every case.

Seldom is subastragaloid arthrodesis in fractures of the os calcis indicated. I am not inclined to do them too early, but certainly think they should not be done in the very late stage. Again, with this type of treatment we have not found a panacea, either.

I have used all types of treatment in different types of fractures of the os calcis, and I am still discouraged so far as expecting a perfect result in every case with any method.

Dr. Robert Carothers, Cincinnati, O.—Within the past five years we have had about a dozen os calcis fractures. They have all been treated by the Böhler method and we have obtained from 90 to 100 per cent good end-results with usefulness and efficiency. The patients all went back to work in from three to six months. If Dr. Böhler had done nothing else for fracture surgery, he would deserve some kind of a crown for his contribution on os calcis fractures. The anxieties we had during the period of treatment and the humiliation we endured in some of the bad results are long since a thing of the past.

The method of treatment is quite simple when understood.

The injured leg is securely placed in the screw traction apparatus. A Steinman pin is put through the heel portion of the bone for traction and another pin through the tibia for overhead counter traction, then traction downward and horizontal, alternating, will overcome the upward displacement of the posterior fragment. Then the depressor, quickly applied, will reduce the spreading. A skin cast and bed traction on a Braun's frame for about two to four weeks, followed by ambulation on crutches, are used. The upper pin is removed early. The lower pin remains in the cast.

Dr. Stewart (closing).—Most of the cases included in my paper were railroad employes and, in my opinion, above the average industrial employe from the standpoint of cöoperation in returning to work following injuries. Scarcely any of them come under state industrial compensation commissions. I believe this also has a bearing on the large proportion who return to their old jobs.

I use non-padded plaster casts in this work and am very enthusiastic about them if they are used by surgeons who are skilled in applying and molding them. I want very emphatically to sound a warning, however, that serious catastrophes are likely to occur from non-padded casts in the hands of those who are not experienced in applying them.

RUPTURE OF THE BLADDER*

By EDGAR G. BALLENGER, M.D., F.A.C.S.,
OMAR F. ELDER, M.D.,
and
HAROLD P. MCDONALD, M.D.,
Atlanta, Georgia

Rupture of the bladder, formerly not frequently seen, is now of rather common occurrence. The increase has been due to several causes: first, the hazards of modern industry; second, automobile accidents; and third, transurethral operations. In spite of the increase in frequency of rupture of the bladder, it is surprising to find how little space is given to it in urological literature. Protected as the bladder is by the pelvic bones, it can stand a remarkable amount of adjacent injury, when undistended, without being ruptured. On the other hand, when distended, slight blows, falls or even missteps may rupture the bladder.

Traumatic accidents which involve the pelvis should always arouse suspicion that the bladder may have been ruptured. Time does not permit enumeration of the many ways in which bladder ruptures may occur. The mortality rate following such accidents usually is high because of delay in draining the bladder and the area into which it is ruptured. Other injuries are often so severe or so obvious that considerable time is lost before the bladder injury is suspected.

In transurethral prostatic resection and in other instrumentation, rupture of the bladder has occurred more frequently than has been suspected. This is clearly shown in the reports of bad results and fatalities following these operations. In reading reports of these accidents, especially in prostatic resections, it is quite sur-

*Read in Section on Urology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

prising to see how much time elapsed before the urologists suspected that the bladder had been ruptured. Undoubtedly, more prompt recognition of this complication would have resulted if the patients had been injured by automobile accidents instead of by transurethral resection; otherwise good urologists have failed at times to suspect rupture of the bladder until forced to do so by prevesical abscesses, peritonitis or postmortem examination.

Diagnosis.—Before the advent of uroselectan, much guess work was involved in the diagnosis of rupture of the bladder as injections of solutions, or of air, through urethral catheters for cystograms or measurement of the solution recovered, while at times facilitating the diagnosis, often seemed to increase the mortality rate. Such procedures tend to spread infection upward and not infrequently do more harm than good. Intravenous urography is a safer procedure, involves little delay and if hemorrhage and shock have not greatly lowered the blood pressure by its use, pictures may be obtained which, in the majority of instances, make the diagnosis easy. Lowered blood pressure may slow the renal functions to a point so low that there is not sufficient excretion of skiodan to cast a clear-cut shadow. Even if doubt still exists after skiodan pictures, no harm and very little delay is caused by this plan.

Pelvic fractures are followed by hematuria in about a third of the cases. Associated symptoms, such as inability to walk, pain, crepitus, or deformity, nearly always require x-ray studies. Time is saved and greater accuracy is made possible when both surgeons and urologists work together. Their combined effort permits prompt cystotomy when rupture of the bladder is present. Early diagnosis and early operation are the most important factors concerned in saving life after this dangerous accident. The chief and immediate dangers are shock, extravasation of urine and infection.

There are two main subdivisions of rupture of the bladder, intraperitoneal and extraperitoneal. In the former the symptoms are, as should be expected, chiefly those associated with peritonitis. There may or may not be vomiting or symptoms of shock; and there are no symptoms upon which an early and certain diagnosis may be based. Patients with completely ruptured bladders rarely can void and, since past experience has shown that urethral instrumentation increases the dangers, urine, most of the time, is not obtainable.

Suspicions rather than positive findings with early intraperitoneal rupture, as well as extraperitoneal rupture of the bladder, are more important than are any exact signs and symptoms. Skiodan pictures, however, taken early and properly interpreted are likely to be life saving. Palliative expectant treatment is very dangerous. If extraperitoneal ruptures are not properly recognized and drained prevesical tumefaction occurs; and soon the bladder and rectum become surrounded by infiltrated, infected and sloughing tissue. The perineum and ischiorectal areas, protected by the triangular ligament and the facia leading from it, are likely not to be invaded.

A careful history should be taken to elicit the type of injury and to estimate if possible whether or not the bladder was full at the time of the accident. Pelvic pain and tenderness, tenesmus, inability to void, symptoms of beginning peritonitis, shock and nausea are the principle symptoms of rupture of the bladder. Frequently other injuries become confusing factors in the diagnosis.

Skiodan, intravenously, will often show obvious evidences of bladder rupture and a definite advantage is obtained by giving it before taking the x-ray pictures which are usually necessary to determine if there are pelvic fractures. As previously stated, it should be remembered that at times low blood pressure from shock may so hinder the output of urine and skiodan that clear-cut bladder pictures may not be obtained. In such cases a urethral catheter should be introduced and a skiodan cystogram made with opaque medium injected from below.

Rupture of the urethra must be considered in all bladder and pelvic injuries, but this will be taken up by Dr. Coppridge.

Treatment.—Regardless of the certainty of diagnosis, when there are definite suspicions of rupture of the bladder, whether intra- or extraperitoneal, the treatment is the same, namely: suprapubic cystotomy and drainage of the bladder and tissues at the ruptured point. Supportive measures such as cardiac stimulants, glucose intravenously, saline solution subcutaneously, and heat should be promptly employed as indicated.

The time allotted for this short paper and its scope forbid discussion of many of the lesions and factors complicating or associated with rupture of the bladder, such as rupture of the pelvis, rupture of the intestines, shock, hemorrhage, hematuria, urinary extravasation, peri-

tonitis, cellulitis, fistulous tracts and osteomyelitis.

The main point intended to be emphasized is that the present mortality rate in rupture of the bladder, which is about 50 per cent, can be lowered only by more prompt, intelligent surgical and urological team work in all accidents where this lesion is suspected.

Paper of Drs. Ballenger, Elder and McDonald is one of a Symposium on Urological Accidents read in Section on Urology at Richmond meeting, November, 1933. Other papers and the discussion will appear in subsequent issues.

EXPERIMENTAL PNEUMOCOCCAL NEPHROSIS AND ITS RELATION TO GLOMERULONEPHRITIS*

By S. S. BLACKMAN, JR., M.D.,
Baltimore, Maryland

Lipoid nephrosis was first described as a distinct form of Bright's disease in 1913 and 1914 by Munk[1] and Volhard and Fahr.[2] Since then many examples have appeared in the literature. At first the very existence of the disease was denied by some, and concerning the nature of nephrosis, its relation to nephritis, and the etiology of the disease there has always been controversy.

The cases first described were characterized by albuminuria, oliguria and edema, without gross hematuria, hypertension or cardiac hypertrophy, and by the absence of nitrogen retention in the blood. Anatomically, destructive glomerular lesions were absent. In the renal epithelium, deposits of lipoid substances were found, and Munk was the first to emphasize the presence of doubly refractile fluid crystals of cholesterol esters. On account of these lipoid deposits nephrosis was described as a form of chronic tubular "degeneration."

In recent years nephrosis has been minutely studied. It is now familiar knowledge that the disease is most often seen in children, and is marked, in addition to other signs and symptoms, by cholesterolemia and reduction of the blood proteins, with inversion of the albumin-globulin ratio of the plasma.

Frequently, repeated attacks of pneumococcal septicemia and peritonitis occur, and sometimes nephrosis disappears with recovery from peritonitis.

Govaerts[3] and Volhard[4] have suggested that nephrosis may be caused by chronic infection with pneumococci. This idea has received little support in the past, however. The theory that nephrosis is essentially different in nature from nephritis has won widespread popularity, and in recent years the disease has been rigidly defined, hedged in by criteria and rules not to be violated.

Clinically, it is required that no abnormal numbers of red blood cells ever appear in the urine, that the blood pressure remain perfectly normal at all times, and that the patients show waxy pallor without anemia. Histologically, the renal tubules must be "degenerated," the glomeruli normal, and it is said that the kidneys are the only organs which show significant lesions. The edema of nephrosis is supposed to be caused purely by mechanical forces, and it is denied that generalized capillary damage and increased permeability to proteins of the blood plasma play any part in the pathogenesis of the edema.

The following summarized data, at variance with most of these theoretical criteria, have been collected during the past several years from the study of classical examples of lipoid nephrosis in the literature, from clinical and anatomical studies of ten examples of nephrosis in children, and as the result of experimental observations on the effect of pneumococcal toxin on the tissues, blood and urine of many laboratory animals.

Four of the ten examples of nephrosis were acute cases of rapid progression, three to seven weeks in duration. These are especially interesting for two reasons. They were associated in a striking manner with evidence of pneumococcal infection of the upper respiratory passages, and in each case fatal pneumococcal septicemia and peritonitis developed. Secondly, in acute cases, doubly refractile crystals of cholesterol esters may be found in very small numbers, though all of the classical signs and symptoms of nephrosis are present. From this it is clear that the presence of cholesterol esters in the renal epithelium can have little significance in the pathogenesis of albuminuria, lipemia, low plasma protein, or edema. Nor are lipoid deposits specific for nephrosis, since they are found in the kidney in many cases of glomerulonephritis.

Anemia was present in six of the cases studied. The hemoglobin varied from 50 to 66 per cent, and in several cases there was progres-

---

*Read in Section on Pathology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

*From the Department of Pathology, Johns Hopkins University School of Medicine.

sive anemia throughout the course of the disease. Similar cases are reported in the literature, and the idea that nephrosis is characterized by the absence of anemia depends chiefly on reports of the blood of adults with the disease, where anemia is often absent.[5] There is evidence that the anemia of nephrosis is a hemolytic anemia. According to Volhard,[6] the typical dark color of the urine depends upon the presence of increased amounts of urobilin, which suggests active blood destruction. In most of the cases which we have examined, the spleen, Kupffer cells of the liver and in some cases the tubular epithelium of the kidneys are pigmented with hemosiderin, which also indicates abnormal destruction of red blood cells. Furthermore, pneumococcal toxin is an active hemolytic agent.

Inflexible rules have been laid down concerning the blood pressure in nephrosis. It has been said that neither early nor late in the disease is an increase of blood pressure ever found.[7] Cases are on record, however, in which transient periods of elevated blood pressure occurred, and, as a matter of fact, careful observations of the variations in the blood pressure of children with nephrosis have not been published. In some of our cases both systolic and diastolic pressures were slightly but distinctly elevated at times, and it is the absence of continuous, progressive hypertension in nephrosis that is significant rather than the presence of absolutely normal blood pressure at all times.

It is impossible to account for the idea that if red blood cells are found in the urine the disease under consideration is not nephrosis. In the original papers microscopical hematuria was described in several of the cases reported by Munk and by Volhard and Fahr. Although Volhard and Fahr stated that hematuria never occurred, they specifically defined hematuria as gross hematuria, adding that microscopical hematuria did occur, and many other cases have appeared in the literature in which microscopical hematuria was observed.

Red blood cells in small but abnormal numbers were excreted in the urine of all of the cases of nephrosis which we have studied. It therefore seems clear, first, that by the absence of hematuria Volhard and Fahr meant gross hematuria, and secondly, that nephrosis is characterized by the appearance of small numbers of red blood cells in the urine from time to time.

Various opinions are expressed concerning the majority of the glomeruli in lipoid nephrosis. They are described by some as normal. Others find so-called degenerative lesions, or evidence of glomerulonephritis. Everyone is agreed that a few scattered glomeruli may be found in some stage of obliteration by scar formation. In the cases we have studied, the following variety of glomerular changes are found: (1) diffuse changes in the glomerular epithelium which are identical in nature with the lesions in the tubular epithelium. (2) Partly and completely scarred glomeruli, focal scars, are found in small numbers at widely scattered intervals. They are identical in appearance with scarred glomeruli which are found diffusely in glomerulonephritis. (3) Tufts of empty capillaries may be found, whose walls look thick compared with the walls of capillaries filled with blood. There is no proof that these capillaries are thick, although they are said by some to be characteristic of nephrosis,[8] and similar thick looking capillaries are found in normal kidneys whose capillary tufts are not filled with blood. (4) Hemorrhages may be found in a few tubules, and there is no evidence that they are different in pathogenesis from the hemorrhages which occur in any form of glomerulonephritis. (5) A few thrombi may be found within glomerular capillaries.

Anatomically, it is the absence of visible changes in the majority of glomerular capillaries, and the absence of clots of exudate within the glomerular capsules that separate nephrosis from other forms of nephritis, for identical so-called degenerative changes in the epithelial cells are found in both nephrosis and glomerulonephritis. Physiologically, the differences between nephrosis and nephritis are differences in degree. Oliguria, albuminuria and hematuria occur in each disease. In glomerulonephritis, in addition, clots of fibrin form within glomerular capsules, are organized, and lead in this way to replacement of glomeruli by scar tissue. This distinction between nephrosis and nephritis, the presence of clots of fibrin in the glomerular capsules in nephritis, is one of the most fundamental differences between them, and it is of the greatest importance to determine why fibrinogen clots to form fibrin in the one case, and not in the other.

In our cases of nephrosis, fat deposits are present in tissues other than the kidneys. The amount of neutral fat in the peripheral liver cells usually parallels that stained in the kidney. Whether or not the same mechanism is responsible for the presence of fat in the kidney, liver and other tissues is unknown, nor is it known

whether the fat in the cells is an expression of slight damage, is the result of lipemia, or is caused in some other way.

In acute nephritis, it is admitted that widespread capillary damage and increased permeability to plasma proteins are concerned in the pathogenesis of edema. In other words, due to capillary damage, blood plasma escapes into the urine and tissue spaces. It is denied that this mechanism is concerned in the pathogenesis of edema of nephrosis. There is an array of evidence, however, indicating the importance of widespread capillary damage as one factor in the development of edema. The mechanical theory fails to account for the presence of blood proteins in the edema fluid, and actually the percentage of protein in the edema fluid of some cases of nephrosis may be equal to the percentage of protein in edema fluid of some cases of nephritis.[9]

There is abundant clinical and bacteriological evidence that many examples of lipoid nephrosis are caused by chronic bacterial infection, and it may be well to recall that the established etiological relation between glomerulonephritis and infection with the *Streptococcus hemolyticus* depends almost entirely on clinical observations and clinical bacteriological studies. There is similar clinical evidence and, in addition, anatomical evidence of persistent pneumococcal infection in the cases of nephrosis we have studied, which may be summed up as follows: (1) In both the acute and chronic cases leukocytosis and low-grade irregular fever were present, usually throughout the disease. (2) In some cases fever and symptoms of pharyngitis, tonsillitis, or otitis were the first to appear, persisted throughout the disease, and were followed by the signs and symptoms of nephrosis. (3) Pneumococci were cultured from the throat in the cases in which cultures were made. (4) All of the acute cases ended with pneumococcal septicemia and peritonitis. (5) Microscopically, subacute and chronic tonsillitis, associated with Gram-positive diplococci, was found in the cases in which the tonsils were examined. (6) In some cases, in addition to evidence of chronic tonsillitis, there was clinical evidence of chronic nasal sinusitis. (7) In each case pneumococcal peritonitis occurred and was often recognized clinically. In several there is histological evidence of the repeated occurrence of unrecognized peritonitis, for in the abdominal and retroperitoneal connective tissues the chronic cases all show a distinct chronic perivascular inflammation. In one case, in addition, two large pneumococcal abscesses, encapsulated with thick walls of scar tissue, were found in the abdominal cavity. (8) The association between nephrosis and bacterial infection has sometimes been explained by assuming that the disease predisposes to infection. It is only necessary to point out that in other disease with edema and ascites the tissues and body cavities are not repeatedly infected with pneumococci. This alone suggests that in nephrosis there is some more intimate relation to bacterial infection than a mere predisposition to infection. (9) The disappearance of the signs and symptoms of nephrosis in some cases associated with peritonitis suggests that the presence of intense infection like peritonitis produces a temporary or even permanent immunity.

The experimental reproduction of nephrosis in rabbits by means of pneumoccal toxin is further evidence that pneumococcal infection may be the cause of some examples of lipoid nephrosis. The toxin, made by autolysis of the bacterial cells, is a general capillary poison, and hemolytic agent. It is antigenic, and repeated intravenous injections are followed by immunity to the toxin and to infection, and by the formation of antitoxin which may be passively transferred.

By means of the toxin, forms of nephritis may be reproduced experimentally corresponding clinically and anatomically to tubular nephritis with necrosis, calcification, and regeneration of epithelium, to acute and progressive glomerulonephritis, and to nephrosis.

Briefly, in order to produce experimental nephrosis in rabbits, several small quantities of toxin were injected intravenously, each of 0.2 to 0.6 c. c. The experimental disease is characterized by oliguria, albuminuria, from 0.5 to 18 grams per liter, occasional microscopical hematuria, casts in the urine, cholesterolemia, edema, and diminution of the plasma proteins with inversion of the albumin-globulin ratio. The non-protein nitrogen of the blood is within normal limits. The disease may be continued until the animals become immune to the doses of toxin used. After immunity disappears, the disease may be reproduced again. Microscopically, the changes found in the kidney consist of varying degrees of damage to the renal epithelium, such as cloudy swelling, fat deposits, the presence of colloid droplets of cytoplasm in some cells, and occasional necrosis of cells. Some of the tubules become dilated, and there may be evidence of regenerated tubular and glomerular epithelium. No diffuse lesions of the glomerular capillaries are found, nor are there any coagula of exudate within the glom-

erular capsules. Crystals of cholesterol esters have not been found either in the urine or kidneys of the experimental animals.

Larger doses of toxin cause the lesions of acute glomerulonephritis with edema and the formation of clots of exudate in the glomerular capsules. Repeated sublethal pathogenic doses lead to the development of progressive glomerulonephritis. As the disease progresses, immunity increases, while albuminuria and cholesterolemia decrease. Polyuria and retention of nonprotein nitrogen in the blood develop. Microscopically, it is found that in the chronic stage, as immunity increases, necrosis of tissue decreases. The glomeruli, however, are distorted and partly destroyed as the result of organizing exudate within the capsular spaces and between the capillary tufts.

It will be seen, therefore, first, that in progressive glomerulonephritis uremia is dependent on the presence of excessive healing processes, that is, the excessive regeneration of glomerular epithelium and organization of exudate.

Secondly, the experiments indicate that increased and abnormal formation of cholesterol is the mechanism responsible for the cholesterolemia of nephrosis. *In vitro* the toxin digests esters with liberation of fatty acids. *In vivo* the highest degree of cholesterolemia is produced by toxin in animals without any immunity. With the progressive increase of immunity, produced by the repeated injection of toxin, cholesterolemia decreases parallel with the disappearance of other known effects of the toxin, that is, necrosis of tissue and albuminuria.

These data indicate that lipoid nephrosis is a particular form of diffuse nephritis, marked by the absence of visible lesions in the glomerular capillaries to account for the excretion of albumin in the urine. Both the anatomical and functional differences between nephrosis and glomerulonephritis are differences in degree, not in kind. There is apparently, however, a fundamental difference in etiology between nephrosis and glomerulonephritis, for many examples of the former disease are clearly related to infection with the pneumococcus.

REFERENCES

1. Munk: Zeitschrift f. klin. Med., **78**:1, 1913.
2. Volhard and Fahr: Die Brightsche Nierenkrankheit. Berlin, 1914.
3. Govaerts and Cordier: Bull. Acad. Roy. Med. Belgique, **8**: 510, 1928.
4. Volhard: Handbuch der inneren Medizin, **6**:11, 1056, 1931.
5. Wilbur and Brown: Arch. Int. Med., **45**:611, 1930.
6. Volhard: Handbuch der inneren Medizin, **6**:11, 1103, 1931.
7. Leiter: Medicine, **10**:149, 1931.
8. Bell: Amer. Jour. Path., **5**:587, 1929.
9. Leiter: Medicine, **10**:177, 1931.

SINUS THROMBOSIS AND THROMBOPHLEBITIS COMPLICATING MASTOIDITIS: CASE REPORTS*

By E. G. Gill, M.D., F.A.C.S.,
Roanoke, Virginia

The diagnosis, medical and surgical treatment of sinus thrombosis constitutes one of the most brilliant and illuminating chapters in the entire realm of medicine and surgery. If all cases presented the classical text-book symptoms, the subject would be of little interest, but more often each case presents some variation which makes the diagnosis and treatment a difficult matter. The purpose of this paper is not to attempt any original suggestion, but rather for an exchange of opinions with the view to evaluating procedures which are in dispute. Some of the unsettled problems are as follows:

(1) In cases where thrombosis of the sigmoid sinus is complete, should the jugular vein be ligated?

(2) Where there is complete thrombosis of the sinus, should all of the clot be removed in order to secure free bleeding?

(3) What surgical procedure should be used in dealing with the vein: (a) ligation, (b) ligation and division, and (c) ligation and resection?

(4) What should be done to the facial vein?

(5) What should be done to the external jugular and emissary veins?

(6) Do the vein and sinus function after ligation?

(7) What place, if any, has chemotherapy in the medical treatment?

The historical development of this subject is well known to all otologists and will not be stressed in this paper, though it is interesting to note that perfection of the operative technic preceded the study of its pathology.

ANATOMY

The sinuses of the dura mater are venous channels formed by the separation of its endosteal and meningeal layers, and are lined by a prolongation of the lining membrane of the veins. They are rigid tubes which always remain patent; their function is to return the venous blood from the brain and its covering,

*Read in Section on Ophthalmology and Otolaryngology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

the diploe (with few exceptions) and also the greater part of the blood from the orbit and eyeball. They collect this blood and convey it to the jugular foramine, where it is taken up by the internal jugular veins. There are sixteen sinuses in all and they consist of two groups: (1) those situated at the upper part of the cranial cavity and those situated at the base of the skull. The former group includes the superior longitudinal, the inferior longitudinal, the straight, the lateral, and the occipital sinuses. The last group includes the cavernous, the sinuses alae parvae, the circular, the superior petrosal, the inferior petrosal, and the transverse. Five are in pairs: the lateral, the superior petrosal, the inferior petrosal, and the transverse. The six single sinuses are the superior longitudinal, the inferior longitudinal, the circular, the transverse, the straight and the occipital. The lateral sinuses, the largest of the cranial sinuses, extend from the internal occipital protuberance to the jugular foramine, terminating at the beginning of the internal jugular veins. Each sinus consists of two portions, a horizontal and a sigmoid. The horizontal portion is situated in the base of the tentorium cerebelli. The sigmoid portion is situated below the tentorium cerebelli and grooves the mastoid portion of the temporal and the jugular process of the occipital bone. The lateral sinus varies in size and position.

Tributaries of the Lateral Sinus.—The right lateral sinus is usually larger than the left. It begins at the torcular herophili and is the continuation of the straight sinus. In addition to the superior and inferior petrosal sinuses, the lateral sinuses receive emissary veins from the scalp, which pass through the mastoid and posterior condyloid foramina; veins from the diploe (the occipital and external parietal); the lateral inferior cerebral, and some of the superior and inferior cerebellar veins.

INCIDENCE

Sinus thrombosis is the most common of the intracranial complications of the middle ear and mastoid infections. Statistics vary, but the average incidence is between five and 10 per cent for both acute and chronic mastoiditis. The acute exacerbations of chronic mostoiditis are prone to produce intracranial complications.

DIAGNOSIS

In the presence of known mastoid infection before or after operation, if there is a sudden rise in the temperature once or twice in twenty-four hours, with or without chills and coincident with a rise in the white blood count, it is an almost definite indication that infection has entered the blood stream. This is the most significant single symptom. It is, of course, assumed that other systemic conditions have been excluded by a thorough physical examination. Seydell,[2] in a brilliant monograph on this subject, has pointed out that rather frequently fever is the only symptom present in an infection of the lateral sinus. He classified the condition as follows:

(1) The pyemic type, which is characterized by pyemic fever. The temperature may range from 96 to 106° F.

(2) The septic form, in which the temperature remains high, the pulse is fast, of poor quality and remains so during remissions.

(3) Most frequently, septicopyemic, where the temperature may be continual, strongly remittent or intermittent. Chills do not occur as often as the text-books indicate. Blaw[3] gathered from the literature one hundred cases of sinus thrombosis, none of which presented chills. Taketabake[4] carefully studied fifty-one cases and only six had chills. In our experience chills occurred in one-third of our cases.

Blood cultures should be taken in suspected cases at twenty-four-hour intervals if negative. Carmack has shown that if cultures are taken before the chill and rise in temperature, a greater number of positive results will be obtained. Positive cultures should be obtained in 75 per cent of all cases. A positive or negative blood culture should never be the sole determining factor in the surgical management of a suspected case of sinus thrombosis. One should always realize that a complete thrombosis of the sinus with negative culture is possible and a positive culture without a sinus thrombosis.

Study of the Blood.—In every suspected case a complete blood count should be made daily. It tells us whether the disease process is going or coming. Ordinarily the leukocyte count is parallel with the severity of the infection. A Schilling hemogram is of much greater value in determining the presence of a severe systemic infection. Eosinophils disappear from the blood in severe infections and their reappearance is the earliest favorable sign. If other complications have not occurred, there should be a rapid increase in the red cells and hemoglobin after the infection is eliminated from the blood

stream. A study of the hemoglobin and red cells is an indication of the need of blood transfusions.

Study of the Bacteriology.—Bacteriological studies should begin when the myringotomy is performed, also when the mastoid is opened. The urine should be centrifuged and stained for bacteria. Wanamaker[5] has been able to find streptococci in the stained smears in sinus thrombosis before the appearance of the organism in the blood. The hemolytic streptococcus is the organism most frequently found.

Changes in the eye grounds occur in a small percentage of cases. When present they vary from a slight fullness of the retinal veins to a choked disc. This condition subsides following thorough drainage of the mastoid. The Tobey-Ayer test is of definite value where there is complete obstruction of the sigmoid or jugular bulb on one side. In performing the test, the patient should be relaxed and the pressure should be made on the jugular vein, continuously, for one minute. There is always a sharp rise in cerebrospinal pressure in the normal individual when one jugular is compressed and this returns to normal within thirty to forty seconds if the other side is patent. It is the sustained pressure or increasing after thirty to sixty seconds that is suggestive of obstruction on the opposite side. Spinal puncture should be done in all suspected cases of intracranial involvement, withdrawing just enough fluid for diagnostic purposes and noting carefully the increase, if any, in the pressure.

TREATMENT

The treatment may be divided into medical and surgical with equal emphasis. Good results have been reported from non-surgical treatments, but the method of choice is to make intelligent use of both medical and surgical treatment. The most effective medical therapy is the transfusion of whole blood. This should be given while we are waiting for definite diagnostic symptoms, sometimes during the operation and during the period of convalescence. The hemoglobin concentration, the red blood count and the general well being of the patient are the indications for the time to give the blood transfusions. If the hemoglobin content is sixty or below, we give transfusions every forty-eight hours. We give from 100 to 150 c. c. The importance of giving whole blood at frequent intervals cannot be too strongly emphasized. We are dealing with a serious condition and a delay of a few hours, not days, often is the difference between success and failure. The donor and recipient should be carefully matched before each transfusion. Both may change. The use of antistreptococcus serum and mercurochrome have not been of value in our cases. Neoarsphenamine, however, has been of definite value and we use it in all cases, giving small dosage intravenously not more than once a week. Intravenous saline and glucose is often used with excellent results. The surgical treatment consists of elimination of the primary focus of infection, prevention of dissemination of the infection from areas with thrombophlebitis, drainage of the vein involved and the treatment of any metastasis. The first step calls for a thorough mastoid operation simple or radical, depending upon the indications. Since it is not always possible to differentiate by symptoms and laboratory tests a sinus clot from a bacteremia, one is justified in performing a mastoid operation and freely exposing the sigmoid sinus. Slightly more than the width should be exposed for inspection and compression if it is decided upon later. The appearance of the bony sinus plate is not to be relied upon. Oftentimes we find a sinus thrombosed or abscessed yet the bony plate was apparently sound. The mastoid emissary should be exposed if present. If there is only slight evidence of phlebitis present, no other surgery is done. The wound is left open and particular care should be used in packing the wound. There is little likelihood that the sinus will become infected if the packing is not placed against it. If the septic symptoms are more pronounced and there is definite evidence of thrombosis, the jugular should be ligated and the lateral sinus opened and drained.

In cases of complete thrombosis, the questions arise: (1) Should the clot be curetted until free bleeding occurs from each end? (2) Should the jugular be ligated before opening the sinus? There is a difference of opinion among the best known otologists of the country on these questions. Our own policy is to ligate the vein before opening the lateral sinus. We do not attempt to remove all of the thrombus from the sinus in order to secure free bleeding. The thrombus is nature's attempt to stop the infection. When the thrombus is removed and free bleeding occurs, gauze plugs have to be used. Gauze plugs are objectionable. (1) One has a foreign body in an infected field adjacent to the dura with the possibility of producing trauma to the brain and possibly meningitis or an abscess. (2) There is the problem of removal. It

is usually five or six days before these plugs can be removed.

It is our policy to open the sinus for about one inch and drain by use of a soft rubber catheter. Never use curettes or any metallic instruments. The opening in the sinus is packed with iodoform gauze to prevent sudden bleeding if there is breaking down of the thrombus. The packing can be removed in two or three days instead of the usual five or six days and this lessons irritation of the brain and general toxemia.

PROGNOSIS

The prognosis depends upon the thoroughness of the primary mastoid operation, the timely and careful administration of whole blood transfusion, the thorough obliteration of foci of infection from areas of phlebitis in accessory veins, the emissary and external jugular and the surgical skill employed in opening and draining the sinus. In this connection the time required for ligating the vein should be considered. If for any reason the operation requires more than thirty minutes, the patient should have intravenous glucose and saline or blood transfusion while on the table. If this is not done, it is best to do the two procedures in stages rather than exhaust the patient's resources by a prolonged anesthesia and operation.

The patients who had positive blood cultures prior to operation and negative afterwards and a corresponding decrease in leukocyte and polynuclear cells, and in whom the Schilling hemogram shows a constant turn to the right, one can feel assured of a good prognosis. Patients with metastasis limited to the extremities usually offer a favorable prognosis. Organisms may be found in the blood for months after the operation and exacerbations with fatal termination occur fairly often. The necessity of observing patients carefully for months following blood stream infection cannot be too strongly emphasized. Avoidance of work, worry, exposure to cold and general supportive and hygienic measures should be rigidly enforced. Death may result from emboli in the lungs or elsewhere, meningitis, pneumonia and general toxemia.

CASE REPORTS

Case 1.—E. R., a school boy, aged 9, entered the hospital March 17, 1933, complaining of pain in his right ear. One week prior to admission the patient had an attack of tonsillitis and during this illness his right ear began paining him. His ear drum was opened by a specialist and has since been discharging freely.

There was some sagging of the canal wall and tenderness on pressure over the entire mastoid. A smear from the right ear showed *Streptococcus hemolyticus infection*. The left ear was normal. The tonsils were injected, the sinuses clear. Temperature on admission was 106°, pulse 130, respirations were 30. Physical examination was negative. X-ray showed a large pneumatic mastoid with definite cloudiness of all the mastoid cells. Blood count showed white cells 19,200, hemoglobin 95 per cent, polymorphonuclears 85, and lymphocytes 15. On March 17, spinal puncture was performed. The pressure was normal and the culture of the spinal fluid was negative. A simple mastoidectomy under general anesthesia was performed on March 18. The mastoid suppuration was marked, the dura was exposed by disease in the middle fossa, but there was no evidence of necrosis of the bone over any portion of the lateral sinus. The patient's general condition was improved by the mastoid drainage. On March 20, he complained of severe pain in his limbs, particularly the left ankle. On March 24, a pure culture of a hemolytic streptococcus was obtained from the aspirated fluid from the left ankle joint. On March 25, the abscess in the left ankle was incised and drained. On March 27, the patient was given 0.2 grain of neoarsphenamine intravenously. On March 28, a 200 c. c. transfusion of whole blood was given. March 29, blood culture showed *Streptococcus hemolyticus*. April 6, another blood transfusion of 200 c. c. of whole blood was given. April 8, a blood culture was negative. On March 21, until April 6, the patient's temperature ranged from normal to 103.8°. At no time did the temperature rise more than once in twenty-four hours and chills did not occur during this period. After the blood transfusion on April 6 the temperature dropped to the normal line and remained so, except on two days, until the patient was discharged on April 18. For complete laboratory findings, temperature, pulse and respiration charts, see ***Table 1*** and ***Chart 1*** (page 722).

Case 2.—E. H., a school boy, aged 8 years, entered the hospital on May 10, 1933, complaining of pain in the right ear and right side of the neck for the previous two weeks. The right ear had been discharging for one week prior to admission. The discharge followed a paracentesis which was done twelve days prior to admission. There was a history of marked elevation of temperature during this period of illness.

The right ear drum was thick and opaque with a healed perforation in the lower quadrant. The left ear drum was normal. The nose, throat and sinuses were negative. Physical examination was negative. His temperature on admission was 104.8°, pulse 140, and respiratory rate 30.

The white blood count was 13,500, red blood count 4,030,000, hemoglobin 80, polymorphonuclears 45, band cells 25, lymphocytes 21, and monocytes 7. Urinalysis showed a faint trace of acetone, but was otherwise negative.

Surgical treatment consisted of simple mastoidectomy of the right ear, performed May 12, 1933. The mastoid was an infantile type; very few cells were present; there was no mastoid suppuration. The sinuses and dura were not exposed. Culture of the mastoid was negative. The patient's temperature curve and general condition were not favorably influenced by the operation. Repeated blood cultures were negative.

Table 1

I—Laboratory Findings of E. R., Case 1 (No. 4180)
(1) *Blood*

Date	W. B. C.	R. B. C.	Hgb.	Pmns.	Band Cells	Promyelocytes	Myelocytes	Eosin.	Baso.	Lyms.	Mono.
3/17/33	19,200		95 (T)	85	0	0	0	0	0	15	0
3/27/33	28,200	3,600,000		87	0	0	0	0	0	13	0
3/28/33	26,800	3,230,000	45 (D)	96		0	0	0	1	2	1
4/ 5/33	12,000	3,580,000	56 (D)	79	0	0	1	0	0	20	0
4/10/33	12,050	3,060,000	60 (D)	79	0	0	0	0	0	21	0
4/13/33	16,750	3,960,000	50 (D)	81	0	0	0	0	1	18	0

(2) *Urine:*
Occasional trace albumin and pus cells; acid

(3) *Bacteriology:*
3/18/33, culture right ear, streptococci
3/34/33, culture left ankle, hemolytic streptococcus
3/24/33, blood culture, contamination
3/29/33, blood culture, streptococci
4/ 8/33, blood culture, negative.

(4) *Spinal Fluid:*
Pressure normal, 3 white cells per cu. mm.

II—*X-ray* of the right ear showed a large pneumatic mastoid, cloudiness of all mastoid cells with indications of mastoid suppuration

III—*Medical Treatment:*
3/27/33, neoarsphenamine 0.2 gm. intravenously
3/28/33, direct whole blood transfusion 200 c. c.
4/ 6/33, direct whole blood transfusion 200 c. c.

IV—*Surgical Treatment:*
3/17/33, lumbar puncture
3/18/33, mastoidectomy, simple
3/25/33, incision and drainage "cellulitis with abscess" left ankle

Chart 1

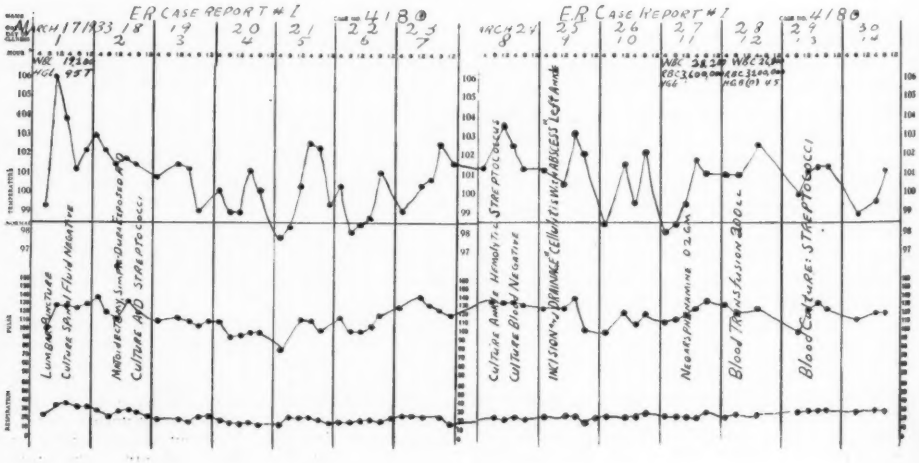


Chart 1 (Continued)

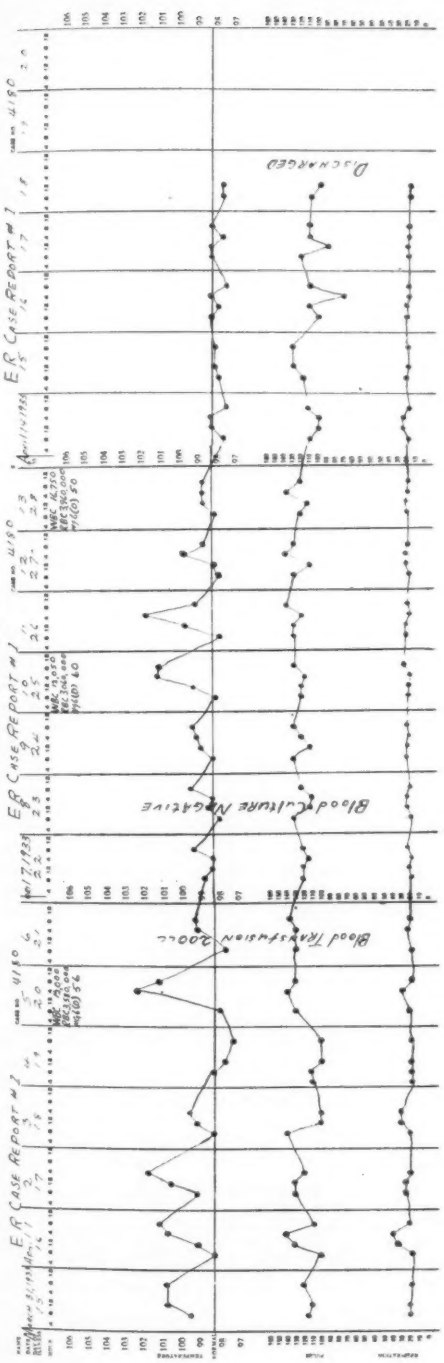


Chart 2

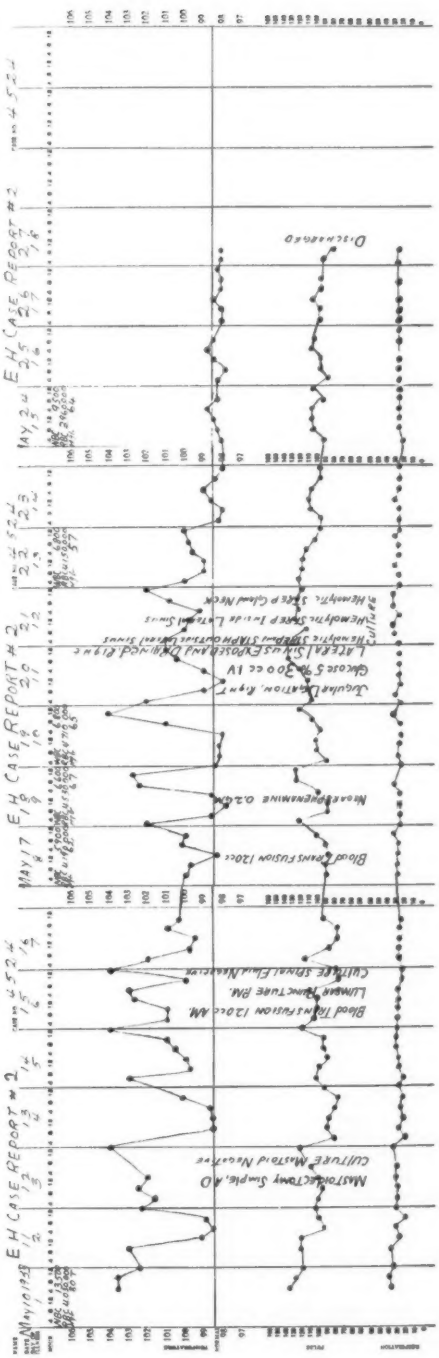


Table 2

I—Laboratory Findings of E. H., Case 2 (No. 4524)
(1) *Blood*

Date	W. B. C.	R. B. C.	Hgb.	Pmns.	Band Cells	Promyelocytes	Myelocytes	Eosin.	Baso.	Lyms.	Mono.
5/10/33	13,500	4,030,000	80 (T)	45	25	0	0	0	0	21	7
5/17/33	5,900	4,190,000	62 (S)	32	30	2	0	0	1	14	21
5/18/33	6,600	4,530,000	67	35	31	3	2	2	0	16	11
5/19/33	6,800	4,710,000	65	42	38	3	0	3	0	8	6
5/22/33	6,800	4,150,000	57	37	32	6	1	0	1	7	16
5/24/33	9,500	3,960,000	64	46	27	3	1	3	0	16	9

(2) *Urine:*
Essentially negative; faint trace acetone on admission

(3) *Bacteriology:*
5/12/33, culture mastoid negative
5/15/33, culture spinal fluid negative
5/20/33, culture:
(a) Hemolytic streptococcus and staphylococcus from outside lateral sinus
(b) Hemolytic streptococcus inside lateral sinus
(c) Hemolytic streptococcus from lymph node from neck

(4) *Spinal Fluid:*
Normal pressure

II—*X-Ray:* The right ear shows an infantile mastoid; no breaking down of mastoid cells. The sinus is fairly far forward. Slight haziness of the mastoid

III—*Medical Treatment:*
5/15/33, direct whole blood 120 c. c.
5/17/33, direct whole blood 120 c. c.
5/18/33, neoarsphenamine 0.2 gm. intravenously
5/20/33, glucose 5 per cent 300 c. c. intravenously

IV—*Surgical Treatment:*
Mastoidectomy, simple right ear, 5/12/33
Lumbar puncture, 5/15/33
Jugular ligation, 5/20/33
Lateral sinus exposed and drained 5/20/33

On May 15, 120 c. c. of whole blood were given. Lumbar puncture was done and the findings were negative. On May 17, another whole blood transfusion of 120 c. c. was given. On May 18, 0.2 gram neoarsphenamine was given intravenously. On May 10 to May 19, the patient's temperature ranged from normal to 104°, a typical pyemic curve. On May 20, the patient was prepared for a jugular ligation. There was an extensive inflammatory involvement and lymph nodes varying in size from one-half to one and one-half inches were encountered and removed. The internal jugular vein was obliterated by broken down thrombus and pus. Free pus was found in the tissues overlying the internal jugular vein. It was impossible to determine whether the pus came from suppurating lymph nodes or from broken down thrombosed blood in the jugular. The lateral sinus was exposed and opened. Free pus was drained from the sinus. No attempt was made to secure bleeding from either end of the sinus. The operation was prolonged due to the inflammatory condition of the neck and 300 c. c. of 5 per cent glucose were given intravenously while the patient was on the operating table. It is interesting to note in this case that the sinus plate was firm and intact throughout. The culture taken from the mastoid area was negative. The culture from inside the sinus plate, from the material inside the vein and the pus from the neck all showed a hemolytic streptococcus. The patient's temperature curve and general condition showed immediate improvement following the last operation. The temperature became normal on the second day and remained so until the patient was discharged from the hospital. The patient did not require any further medical treatment. For complete laboratory findings, see *Table 2* and *Chart 2* (page 723).

Case 3.—F. A., a school girl, came to the hospital on May 5, 1933, complaining of pain in the left ear and double vision. Six days prior to her admission to the hospital the right ear drum was incised and it has since been discharging freely.

Examination of the left ear showed profuse discharge from the middle ear and tenderness on pressure over the entire mastoid. The right ear was normal. The nose, throat and sinuses were negative.

Vision was 20/20 in each eye; and the pupils reacted to light and accommodated. The eyegrounds were negative.

All the muscles functioned normally with the exception of the left external rectus which showed a complete paralysis. X-rays showed large pneumatic mastoids on both sides with cloudiness of all the cells on the left side.

The temperature, pulse and respiration were normal on admission.

A simple mastoid operation was done May 13. Free pus was found in the mastoid antrum and soft bone

throughout the entire mastoid. No sinus or dura was exposed.

Blood count the day of operation was as follows: white cells, 5,750; hemoglobin, 85 per cent. Mastoid culture showed a hemolytic streptococcus. The day following the operation the temperature rose to 104°, but dropped to normal the same day, and remained so for five days. On May 7, the temperature again rose to 104° with a coincident rise in the leukocyte count from 12,000 to 30,000. The following day, May 20, the temperature rose to 105.2°. Spinal puncture at this time was negative for pressure and culture. A whole blood transfusion of 120 c. c. was given. The temperature continued to range from normal to 105° and on May 22 the lateral sinus was exposed and opened. A mural clot was removed; the jugular vein was ligated. Antistreptococcus serum was given on May 23. Neoarsphenamine and a blood transfusion were given on May 24. On May 27 and 29, whole blood transfusions were given. On May 31, the temperature dropped to normal and remained so until the patient was discharged on June 8.

It is interesting to note that during the hospital stay there was no improvement in the function of the left external rectus muscle and all blood cultures were negative. Pain of a temporoparietal type was more or less pronounced during the time the patient was in the hospital. The temperature curve was of a septicopyemic type. The middle ear and mastoid wound were in good condition on the day of the patient's discharge. Twenty-six days after discharge from the hospital the patient died at home of meningitis. An autopsy was not obtained. As this patient had a typical Gradenigo's syndrome, it is quite possible that a localized meningitis existed prior to the blood stream infection and was the primary cause of the fatal termination.

For complete laboratory report and temperature curve, see *Table 3* and *Chart 3* (page 726).

SUMMARY

Lateral sinus thrombosis is the most common of the intracranial complications following middle ear and mastoid infection. It occurs most

Table 3

I—Laboratory Findings of F. A., Case 3 (No. 4297)

(1) *Blood*

Date	W. B. C.	R. B. C.	Hgb.	Pmns.	Band Cells	Promyelocytes	Myelocytes	Eosin.	Baso.	Lyms.	Mono.
5/13/33	5,750	.....	85 (T)	28	....	....	....	....	....	72	....
5/18/33	12,000	3,600,000	59 (S)	30	8	2	0	3	2	51	0
5/19/33	30,100	3,920,000	61	69	17	1	0	0	0	13	0
5/20/33	16.200	3,920,000	63	48	36	2	3	0	0	11	0
5/23/33	13,000	3,310,000	55	37	55	2	1	0	0	4	1
5/24/33	12.700	3,520,000	55	37	42	4	1	0	0	14	2
5/26/33	9,450	4,030,000	65	34	50	3	2	0	0	11	0
5/29/33	9.550	3,890,000	60	12	69	4	2	0	0	8	5
6/ 1/33	13,350	4,400,000	69	57	25	1	0	0	0	17	0
6/19/33	25,400	4,480,000	74	45	31	2	2	0	0	16	4
6/20/33	19.900	3,980,000	71	55	30	2	0	0	0	9	3
6/24/33	22.050	4,260,000	82	56	31	2	2	0	0	7	2

(2) *Urine:*
Essentially negative

(3) *Bacteriology:*
5/13/33, culture mastoid hemolytic streptococcus
5/19/33, culture blood negative
5/20/33, smear right ear streptococci
5/22/33, culture spinal fluid negative

(4) *Spinal Fluid:*
5/20/33, pressure normal, 2 white cells cu. mm.

II—*X-Ray* of the left ear shows a large pneumatic mastoid. Generalized haziness and cloudiness throughout. No definite breaking down of mastoid cells. Large nozymogatic cells present.

III—*Medical Treatment:*
5/20/33, direct whole blood transfusion 120 c. c.
5/22/33, normal salt 150 c. c. intravenously
5/24/33, direct whole blood transfusion intravenously 150 c. c.
5/26/33, glucose 5 per cent 300 c. c. intravenously
5/27/33, direct whole blood transfusion 180 c. c.
5/29/33, direct whole blood transfusion 150 c. c.
5/24/33, neoarsphenamine 0.2 gm. intravenously
5/23/33, antistreptococcus serum intramuscularly

IV—*Surgical Treatment:*
Mastoidectomy, simple, left ear, 5/13/33. Lumbar puncture 5/20/33. Lateral sinus exposed, drained, and jugular ligation, left, 5/22/33

Chart 3

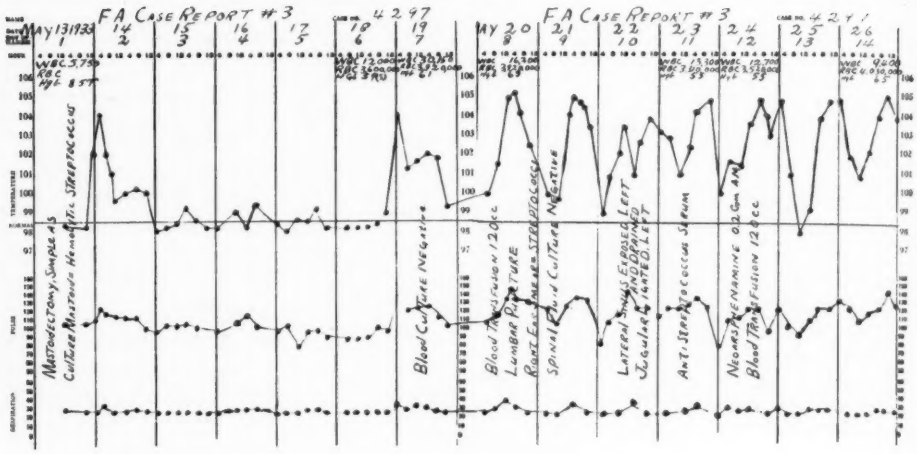
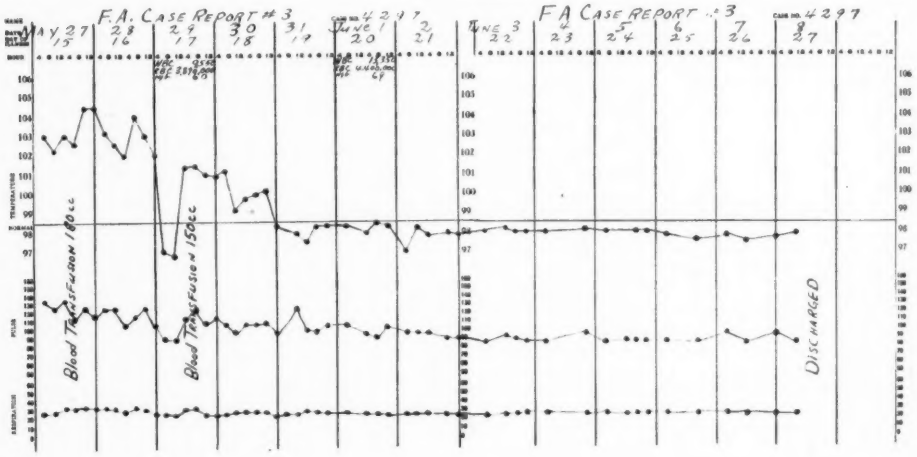


Chart 3 (Continued)



frequently in men and in both acute and chronic ear infections.

Sinus thrombosis may arise from other sources than the mastoid cells, namely: (1) infection from the scalp through the mastoid vein, occipital diploic and posterior temporal diploic veins and through the superior longitudinal and the cavernous sinus. (2) The bulb may become involved by direct extension from the middle ear or from the labyrinth through the internal auditory vein and the inferior petrosal sinus. We may also have a thrombosis from infections in the neck. While these avenues of infection exist and must be recognized, the majority of all cases of involvement of the lateral sinus result directly from an extension of the mastoid infection with necrosis of the surrounding bone. Usually a peri-sinus accumulation of pus forms with bacterial invasion of the vessel wall. It is possible in practically all cases of sigmoid involvement to find a necrotic fistula in the bone extending from the mastoid cells to the sinus. Blood stream infections from thrombophlebitis of the sigmoid may usually be classed as the result of delayed or neglected mastoid drainage. A generalized infection following a

suppurative process in the middle ear and mastoid is so often associated with sinus thrombophlebitis that the terms otogenous pyemia and sinus thrombosis are frequently regarded as synonymous. Haymann[6] has shown by his experiments that bacteria may pass into the sinus wall and enter the circulation without the presence of a thrombus in the sinus. It is this type of infection that responds to medical treatment. It unquestionably explains why some writers report favorable results in sinus thrombosis without surgical interference with the sigmoid sinus and internal jugular vein. Emphasis should be placed upon the importance of daily blood studies in every suspected case. When the hemoglobin concentration and the erythrocyte count continue to fall, whole blood transfusion should be given. The responsibility for the management of these cases rests entirely with the otologist and he must carefully and diligently supervise the laboratory work, the blood transfusions as well as the surgical treatment. In any case of sigmoid phlebitis with bacteremia, the jugular vein should be ligated at once. Any case which has not been ligated at the time of the mastoid drainage should be ligated within seventy-two hours unless definite improvement is observed. The same treatment of the vein applies to the cases of complete thrombosis of the sinus. It is not necessary or advisable to remove all of the clot from the sinus in order to secure free bleeding. Free drainage[7] through an incision about one inch long with careful removal of the clot only at the point of the incision, will permit drainage from either end, if there is breaking down of the thrombus. Section of the vein should rarely, if ever, be done and that only when it contains a clot. If only ligation has been done under perfect asepsis the wound should be closed.

The jugular vein should be ligated above the facial vein. If the jugular vein is ligated below, then the facial vein should be ligated.

The external jugular[7] vein communicates directly with the internal jugular vein. Cases have been reported where recovery was delayed until the external jugular was ligated. The mastoid emissary connects the posterior auricular and the sigmoid sinus. It often passes through pneumatized bone and may become involved primarily. Examination of the patency of the emissary is a valuable diagnostic aid in suspected thrombophlebitis of the sigmoid. It is not patent in about 25 per cent of cases.[8] Involvement of the emissary may be by continuity of tissue or by extension of the thrombus from the sigmoid and should be considered in all cases of lateral sinus thrombosis.

There have been sufficient experimental work and clinical observations by experienced otologists to establish clearly the fact that the circulation of blood recurs following ligation of the jugular vein and drainage of the sigmoid sinus. The only chemotherapeutic agent which has proven of value in our hands is neoarsphenamine. Antistreptococcus serum and bacteriocides have been used without benefit.

Reduction in mortality rate depends upon: (1) Prompt and thorough mastoid drainage. (2) Careful inspection and palpations of the sinus wall in all suspected cases. (3) Early ligation and drainage of the sinus and obliteration of areas of thrombophlebitis. (4) Whole blood transfusions as indicated by the hemoglobin concentration, the erythrocyte count and the well being of the patient.

BIBLIOGRAPHY

1. Deaver, J. B.: Surgical Anatomy of the Head and Neck.
2. Seydell, Ernest M.: Ann. Otol., Rhinol. & Laryngol., **41**: —, June, 1932.
3. Blau: cited by Seydell.[2]
4. Takatabake: cited by Seydell.
5. Wanamaker, A. T.: Transactions of the American Laryngological, Rhinological and Otological Society, p. 238, 1930.
6. Haymann: cited by Wanamaker.[5]
7. Carmack, John W.: personal communication.
8. Ziegelman, Edward F.: Arch. Otolaryngol., **18**:298, Sept., 1933.

DISCUSSION (*Abstract*)

Dr. Thomas E. Hughes, Richmond, Va.—In a large percentage of cases only one organism is found when the cu'ture is taken from the lateral sinuses and this one organism is usually the streptococcus.

Undoubtedly, the virulence of the organism present, the resistance of the patient, the anatomy of the mastoid and the thoroughness of drainage, or lack of it, play their role in the development of sinus thrombosis following acute otitis media and chronic mastoiditis.

Granting that these are important factors in the causation of thrombophlebitis and sinus thrombosis, it is natural to assume that these conditions develop sometimes prior to mastoidectomy.

On the other hand, we are confident that the condition also develops after the operation. Let us presume we have a cavity, the mastoid cells, filled with pus and virulent organisms and yet the absence of blood stream infection. Then we operate, clean out the diseased tissue and drain the cavity. Certainly, with such a procedure, we should expect the patient's condition to improve; but instead, he becomes seriously ill with a b'ood stream infection due to the migration of bacteria into or through the wall of the sinus, injuring it, in some manner, to the extent of producing an inflammation or a blood clot in its lumen and, probably, a septicemia.

Why did not the migration of bacteria take place before the operation? Was it due to the breaking

down of the natural barriers? Or was it due to trauma? Both probably played a part in upsetting the apple cart, though, I believe, that instrumental injury of the sinus wall, or piercing it with a bone fragment, are important factors.

Seydell states that Haymann found, experimentally, that no harm resulted from painting the uncovered sinus wall with virulent bacteria even though the wall had been superficially injured. However, if a tampon saturated with bacteria were placed against the sinus wall and allowed to remain there, infection of the sinus develops. He also found that pressure alone produced no trouble; but that pressure, plus bacteria, always produced infection of the sinus wall.

It is the opinion of Haymann that a lesion of the intima is necessary for the production of a thrombus.

While it is true that a sudden rise in temperature, an increase in the leukocyte count and a positive blood culture following mastoidectomy almost certainly mean thrombophlebitis or sinus thrombosis, nevertheless these signs sometimes lead us astray.

The first patient operated upon for mastoiditis by myself during my hospital internship presented all these classical signs several days after operation and the following day showed a beautiful case of erysipelas of the face, fortunately, before we had interfered surgically.

The treatment is primarily surgical. After the operation the patient's general condition should be watched carefully and he should be given the necessary supportive measures, such as a nourishing liquid diet by mouth, and glucose and whole blood intravenously when indicated.

The simplest surgery is usually the best. Ligation of the jugular vein seems to be as efficacious as resection of it; however, I am inclined toward the latter procedure, particularly if the clot extends into the vein. To obtain the flow of blood from both ends of the sinus appears to me to be reasonable surgery and safer than leaving infected clots *in situ* to be carried to other parts of the body.

Dr. B. P. Woodson, Temple, Tex.—Dr. Gill has given us a very clear presentation of the anatomical portals of entry for thrombosis of the lateral sinus complicating mastoiditis. It is essential and fundamental in the treatment of mastoiditis to have these atria clearly before us.

Sinus thrombophlebitis is the most frequent of all aural complications, and when it occurs in a chronic purulent otitis it is only during an acute exacerbation of the chronic suppuration. It has been our experience that the exacerbation in these cases is so insignificant as to be forgotten by the patient.

I would also like to emphasize the importance of taking a blood culture early since it enables us to make a differential diagnosis between sinus thrombophlebitis and meningitis. A positive blood culture is a definite indication for surgical interference.

Papilledema is more frequent with sinus thrombophlebitis than with either cerebellar or temporosphenoidal lobe abscess. However, in our cases it has been of a mild degree and without hemorrhages.

It has been our practice in chronic thrombophlebitis to drain the sinus and to remove the entire clot with as little trauma as possible and obtain free bleeding from both ends, that is, after ligation of the jugular vein.

TRACHOMA IN THE NATIVE WHITE POPULATION OF THE UNITED STATES*

By C. E. Rice, M.D.,†
and
Avery A. Drake, M.D.,‡
Rolla, Missouri

Trachoma, meaning roughness, is primarily a granular inflammation of the conjunctiva of the eyelid. It is differentiated from other conditions which produce granules or follicles of the conjunctiva principally by its chronic course and involvement of the cornea, usually early in the course of the disease.

At the present time trachoma is epidemic[1] in Egypt, China, Japan, India, Palestine, and Russia. It is endemic in Roumania, Czechoslovakia, Yugoslavia, Poland, Bulgaria, Italy and Spain. In the United States it is endemic in Missouri, Tennessee, Kentucky, Arkansas, southern Illinois and West Virginia. Sporadic cases are found in many other states.

From the time that the United States Public Health Service, in cooperation with certain state departments of health, entered upon a program aimed at eradication of trachoma, a large number of individuals with trachoma have been observed; in Kentucky, 9,087 from 1913 to 1933; in Tennessee, 3,653 from 1916 to 1933; in Missouri, 5,388 from 1923 to 1933; in Arkansas, 1,123 from 1922 to 1928; in West Virginia, 655 from 1915 to 1918. At the request of the Illinois State Board of Health, nine diagnostic clinics were held, at intervals, during 1930 and 1931 by the Public Health Service. These were held in southern Illinois, where the disease is endemic. Of 858 individuals examined, 314 were found to have trachoma.

Rosenau[2] in his book, "Preventive Medicine and Hygiene," states that trachoma is frequently encountered among the white population of some of our southern and midwestern states and that it is endemic in the poorer sections of all the large cities. This statement is contrary to our experience. Trachoma is rather rare in our large cities today, but it is endemic in many rural sections of the states mentioned above.

---

*Read in Section on Public Health, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

†Surgeon, U. S. Public Health Service.

‡Missouri State Board of Health.

The victim of trachoma has congested eyes, a feeling of roughness, as if something were scratching the eyeballs, sensitiveness to light, a watery discharge and, after a time, impaired vision. After many years the lids may become distorted (incurved) causing the lashes to rub the cornea.

On everting the lids of early cases of trachoma the mucous membrane is seen to be highly inflamed and thickened; follicles are present in the thickened mucous membrane of both upper and lower lid. The small vessels seen in the healthy palpebral conjunctiva are absent. Trachomatous changes occur primarily in the conjunctiva of the eyelids. Such changes eventuate in scar tissue which may be seen even fifty years later.

Trachoma very early involves the cornea in nearly every case. The cornea should always be carefully studied. The earliest changes occur usually within three months and are manifested by celluar infiltration of the corneal tissue and usually vascular penetration of the cornea. This is known as "pannus," which is practically pathognomic of trachoma.[3] Corneal ulcers may form in early life. We have seen severe trachomatous ulceration, with impending perforation of the cornea, in a female infant of eighteen months.

Corneal involvement in trachoma should not be thought of as a complication, but as an integral part of the disease in humans. It may continue after the conjunctival disease has been entirely arrested. There is a wide variation in the susceptibility of corneas to involvement, a variation which has never received adequate explanation. Corneal trachoma with the incident failure of sight renders the disease a problem in public health.

Trachoma probably originates exclusively from the secretions of another eye affected with the disease. As a rule, there is a history of close contact with infected individuals as in the case of large families living in contracted quarters and using common towels, wash basins, and so on. Under conditions of school life, spread of the disease is limited and it seems unwise to exclude trachomatous children from school, provided they are under treatment.

The disease usually has its beginning in childhood or early adult life, the infection coming from the parents or other members of the family or from a marital partner.

In view of the fact that trachoma is prevalent among persons of low economic status, living under wretched, unhygienic conditions, it has been contended that trachoma may be a food deficiency disease.[4] Our observations lend no support to this view. When one considers that trachoma is widely prevalent among professional wrestlers, it does not seem likely that the food deficiency theory is well founded. Undernourishment is not particularly manifest in the trachoma cases in Missouri, Kentucky and Tennessee. An infestation with hookworm has never been seen in a Missouri case. Hookworm infestation, however, is quite prevalent among the Kentucky trachoma cases.[5]

In 1927, Noguchi[6] described an organism, *Bacterium granulosis,* which he believed to be the cause of trachoma. Other observers have often found this organism, but its etiologic relationship to the disease is still in question. The inclusion bodies of von Prowazek that are often seen in stained scrapings from the trachomatous conjunctiva have been reproduced artificially[7] by instilling certain bacteria and chemicals into a normal conjunctival sac. Friedenwald[8] states that these inclusion bodies are rarely seen in trachoma in this country. In a series of 230 cases intensively studied by Bengtson[9] at Rolla, Missouri, inclusion bodies were found in 45 per cent. It cannot be said, therefore, that the problem of etiology has been solved.

Trachoma is found in all age groups. This is in striking contrast with folliculosis, a disease resembling trachoma. Folliculosis occurs predominantly in young children; beyond the age of 14 it is seldom seen.

Since the work in Missouri was started, in 1923, we have surveyed over 5,000 cases. In this group of cases it is found that the males predominate. In three contiguous counties where intensive field work was done, 1,151 cases of trachoma were found, of which 60.4 per cent were males. It is possible that some cases in females were missed which would have been found by a more careful house-to-house search. However, the 1,151 cases mentioned were not selected in any way and can really be considered a fair random sample of the trachoma occurring in a rural area of Missouri of over 2,500 square miles, with a population of 51,000.

There is considerable variation in the severity of trachoma the world over, and even within the borders of our own country. Trachoma among the Chinese[10] probably does less damage than among the white population of Missouri and Arkansas. The number of blind eyes and entropions per 100 cases of the disease can be used

as a measure of the virulence of trachoma. Studies have been made in five areas of this country based on such measurement. These areas, in the order of decreasing virulence, are:[11] Missouri, Arkansas, Kentucky, Tennessee and Georgia.

The diagnosis of trachoma must be made solely on the clinical signs. There is no difference histologically[12] between the follicle of trachoma and the follicle of benign folliculosis. The laboratory, therefore, offers no help in differential diagnosis. Statistics on trachoma emanating from states where trachoma is reportable are very untrustworthy, owing to the inability of many examiners to make a correct diagnosis. There are several conditions simulating trachoma, such as vernal catarrh, folliculosis and follicular conjunctivitis. The last two are often mistaken for trachoma.

A thickened and inflamed mucous membrane at the base of the follicle should make one suspicious of trachoma. The upper part of the cornea should be examined by focal illumination and high magnification. In true trachoma there will sooner or later be found infiltration and vascular invasion in nearly all cases. There is no need for a hurried diagnosis. One should make frequent inspections of doubtful cases over a period of several weeks or the therapeutic test may be applied. Suspected cases may be placed on some mild astringent solution, such as 0.2 per cent zinc sulphate or 2 per cent mercurochrome, continued for six or eight weeks. Complete recovery would then definitely place the conjunctival inflammation in the category of a benign follicular disease. If, on the contrary, the condition has remained at a standstill or has grown worse, the health official should strongly suspect trachoma and call upon the eye specialists for confirmation of his suspicions.

In one locality, a large number of public school pupils showed conjunctival and palpebral congestion with the formation of follicles, giving rise to great concern among the local physicians, parents and teachers. The therapeutic test was applied by the school teachers themselves after being instucted by physicians.[13] Twice each day the affected pupils received instillations of zinc sulphate solution or 2 per cent mercurochrome. At the end of six weeks expert examination proved that nearly all had recovered.

Trachoma can produce blindness or near blindness very early in life. Among 5,000 odd cases observed in Missouri, one out of every seven or eight had vision reduced to 20/200 or less. Of these, approximately one-third were below the age of 40 years, and about 10 per cent were below the age of 20 years. In Missouri there is found one trachoma blind pensioner to every 26 cases of trachoma.[14]

But there is a brighter side of the picture. Many individuals examined in field clinics and in the out-patient clinics at the hospital show the presence of scar tissue in the lid conjuntiva, the indubitable sign of a once active trachoma. Often there has been no treatment beyond home remedies; nevertheless, the disease has run its course, and recovery has ensued without damage to vision. This point needs emphasizing, as many people are under the impression that all cases of trachoma left untreated eventuate in blindness or near blindness. There is a big percentage of mild cases of trachoma just as there is in other infections. But these mild cases can act as foci of infection.

The program as carried out by the United States Public Health Service in cooperation with various state health departments is a threefold one, based on: (1) case finding, which is accomplished largely by the trachoma field nurse; (2) education as to proper personal and family hygiene (this is accomplished by the trachoma field nurse in the home and by the hospitalization of the individual patient); and (3) treatment of the active cases as given at the hospital, the out-patient clinic at the hospital, and the field clinics held from time to time in various parts of the state.

The work in the field is mainly carried on by public health nurses who have been especially trained. The work of the trachoma field nurse plays a very important part in the program. She visits homes and schools and examines the eyes of those with whom she comes in contact, noting all cases suspected of trachoma. It has been found that school examinations alone do not give a true picture of the prevalence of trachoma in any one community, for the reason that the child with trachoma soon drops out of school. This has been found true repeatedly. The field nurse instructs trachoma families about personal and family hygiene, and gains their confidence and good will. One of her duties is to organize diagnostic and treatment clinics at which new cases are examined and advised to come in regularly for treatment or to enter the hospital. The field nurse keeps in touch with former hospital patients in her territory and, if they again require treatment, urges them

either to go to the hospital or to come to the clinics. It is often difficult to secure the consent of parents to permit their children to go to the hospital, and repeated visits by the nurse may be necessary before the goal is reached.

MacCallan,[15] in the early part of this century, started the English campaign against trachoma in Egypt by establishing small temporary field hospitals. A somewhat similar plan was adopted by Surgeon John McMullen, of the United States Public Health Service, when, in 1913, he inaugurated the campaign against trachoma. Today this plan is still followed and in the heart of endemic areas small temporary hospitals are established, partly supported by the interested state health department and partly by the United States Public Health Service. They are operated solely for the treatment of trachoma, and without charge to the patient for board, lodging and professional care. However, the patient is required to furnish his transportation to and from the hospital, and to pay for the laundering of his personal clothing. In Kentucky, the Louisville and Nashville Railroad has for many years furnished free transportation for trachoma patients to and from the hospital.

The use of individual towels and soap is enforced, and the patient's hygienic habits are supervised. Thus, new standards of personal hygiene are developed and new ambitions are aroused; and on the return of the patient to his home, his family benefits from his newly acquired knowledge.

The number of drugs and other agents that have been used in the treatment of trachoma is legend. Only a few have proven very useful and have stood the test of time. No specific treatment has ever been found. Nature heals trachoma by producing scar tissue in the eyelids, and man's most successful efforts to this end have been secured by the use of agents which, while not unduly traumatizing the eyes, stimulate the production of scar tissue in the subconjunctival tissue of the lids. The therapy of trachoma in the severe cases is anything but satisfactory. It is doubtful that therapy in this disease has advanced much in the last fifty years.

Our general routine treatment of trachoma at the hospitals is as follows: at 6:30 a. m. all patients' eyes are irrigated with a solution of 90 grams of boric acid powder and 30 grams of sodium chloride to 4 liters of water. At 9:00 a. m. all patients are examined and treated by one of the staff physicians. We usually use 2 per cent silver nitrate, copper sulphate stick, boric acid powder or 7 per cent trichloracetic acid in all cases of acute and subacute trachoma. After the use of one of these on the well everted lid the conjunctival sac is flooded with the irrigating solution. At 11:15 a. m. the irrigation is repeated, followed by drops of a solution of 120 grams of boric acid powder and 8 grams of zinc sulphate to 4 liters of water. This routine is repeated at 4:15 p. m.

Grattage is practiced when the lids exhibit exuberant granulations. Under holocaine and novocaine anesthesia, the conjunctival surface is carefully scraped with a dull scalpel, followed by a brisk rubbing with a dry piece of gauze. Then 20 per cent silvol is instilled and ice water compresses are applied to the eyes for one-half to one hour. Postoperative treatment consists of frequent irrigation and the application of a silver protein preparation (20 per cent silvol) four times daily until the operative reaction has subsided and all slough has disappeared from the lids. Then the medical treatment outlined above is begun.

Canthoplasty is another operation that we find extremely useful. It is indicated in eyes with narrowed palpebral apertures, in blepharospasm, frequently in corneal ulceration, and in sensitive eyes which are irritated by the scraping action of the roughened lids. Canthoplasty and grattage are frequently performed at the same time.

The period of hospital residence averages 29 days. The cost per patient per day was $2.08 during 1932 at the Trachoma Hospital at Rolla. Approximately 23 per cent of all patients return to the hospital two or more times with recurrences of the disease.

Trachoma eradication work is now being carried on by the United States Public Health Service in cooperation with the state health departments of Kentucky, Tennessee and Missouri. The trachoma work in Tennessee at present is carried on by a field unit of one physician and two nurses with headquarters in the small mountain town of Gainesboro. One nurse is almost constantly employed in searching for new cases of trachoma; the physician and one nurse hold treatment clinics at regular weekly intervals in several near-by counties. Six hospital beds are available at Gainesboro for the more severe cases.

In Kentucky, the trachoma field hospital is located at Richmond in a large colonial mansion owned by the Kentucky State Medical Society. It has been possible in that State to interest and

train several county health officers in treating the milder cases of trachoma at regular weekly clinics.

Cooperation and encouragement have been given us by ophthalmologists, as it is realized that our program in no way infringes on the rights of the private practitioner. Many of our patients are sent or brought to us by their family physicians and many are referred by ophthalmologists.

The patient with trachoma needs general as well as special care, and nearly always he or she is handicapped by lack of money. If proper provisions for this care are not made, then the state is likely to have a helpless blind man or woman on its hands. Trachoma patients adequately treated do not go blind, though many suffer impaired vision in spite of all treatment. The large majority of trachoma patients either do not seek treatment at all, or do so only after their vision has been more or less impaired. Early treatment before the disease has gained a firm foothold, and before vision has become impaired, would save these patients untold misery and would cost the state and Federal governments far less. It is thus seen how vitally necessary it is to uncover as many early trachoma cases as possible. To do this requires house-to-house visiting, often in remote and sparsely populated regions. This explains why field nurses are indispensable.

REFERENCES

1. Morax, V.; and Petit, P. J.: Le Trachome, pp. 235-280. Paris: Jean Morax, 1929.
2. Rosenau, Milton J.: Preventive Medicine and Hygiene, p. 466. New York: D. Appleton & Co., 1927.
3. Trachoma Committee, Section on Ophthalmology, American Medical Association, 1921.
4. Stucky, J. A.: Trachoma: Suggestions as to Diagnosis, Etiology and Treatment. Sou. Med. Jour., **19**:140-144, Feb., 1926.
   Some Unsolved Problems of Ophthalmology and Otolaryngology. Jour. Indiana State Med. Assn., **22**:507-510, Dec. 15, 1929.
5. Sory, Robert, Acting Assistant Surgeon: personal communication.
6. Noguchi, H.: Experimental Production of a Trachoma-like Condition in Monkeys. J.A.M.A., **89**:729-742, Sept. 3, 1927.
7. Gifford, S. R.; and Lazar, N. K.: Inclusion Bodies in Artificially Induced Conjunctivitis. Arch. Ophth., **4**:468-475, Oct., 1930.
8. Friedenwald, Jonas S.: The Pathology of the Eye, p. 233. New York: Macmillan Company, 1929.
9. Bengtson, Ida A.: The Epithelial Cell Inclusions of Trachoma. Amer. Jour. Ophth., **12**:637-650, Aug., 1929.
10. Howard, Harvey J.: Results of Recent Investigations in the Etiology of Trachoma. Amer. Jour. Ophth., **16**:218-228, March, 1933.
11. Rice, C. E.; Smith, J. E.; and Sory, Robert: Comparison of Trachoma Virulence in Different Sections of the United States. Public Health Reports, **47**:1149-50, May 20, 1932.
12. Lamb, H. D. personal communication.
13. Rice, C. E.: A Trachoma Survey in the Rio Grande Valley of Texas. Public Health Reports, **47**:38-40, Jan. 1, 1932.
14. Rice, C. E.; and Smith, J. E.: Trachoma and Trachoma Prevention Work in Missouri. Public Health Reports, **47**: 885-893, April 15, 1932.
15. MacCallan, A. F.: Trachoma and Its Complications in Egypt. Cambridge: University Press, 1913.

DISCUSSION (*Abstract*)

Dr. W. F. Lunsford, Jefferson City, Mo.—Trachoma in Missouri is a disease of great importance. One has only to look at the enormous amount paid out to blind pensioners to realize the economic loss to the State caused by trachoma.

Dr. McGaugh, State Commissioner of Health in Missouri, wishes to take this opportunity of expressing his appreciation publicly to Dr. Rice for the excellent program that he is carrying on in Missouri.

Dr. A. T. McCormack, Louisville, Ky.—It is a pleasure to note the progress that has been made in the scientific and practical attitude of the whole profession in regard to trachoma. To the older ones amongst us, it is very gratifying to find the practical agreement in the viewpoint of those of us who specialize in public health, like the essayists, and those who specialize in the diseases of the eye, like Dr. Jervey.

Trachoma is still a serious problem in Kentucky. The reduction in both state and Federal budgets for the past two years is already represented by a distinct increase in the instance of the disease in its endemic centers in Kentucky. It is false economy to permit people with trachoma to remain untreated when we know that a considerable percentage of these cases, if neglected, result in partial or total blindness. I think it is important that we bring this matter to the attention of our representatives in Congress. The appropriation for the reduction of this easily eradicable disease has never been sufficient. It is now much less than sufficient.

It is a pleasure to commend the very fine work that is being done by the United States Public Health Service since Dr. John McMullan and his associates and successors undertook the leadership in this work. No single project in public health has ever been worked out more completely and more scientifically. If the American people desire to be rid of trachoma they should be made to understand that they can do it at a very reasonable cost. If they fail, it will cost a thousand times as much to keep on having this serious disease.

Dr. Drake (closing).—Fortunately, trachoma as seen in the Southern states is not nearly so serious as the trachoma that we see in Missouri. Missouri has a blind pension law which pays each blind individual $25.00 per month. On January 1, 1933, Missouri had a blind pension of approximately $300,000.00 per annum. Of those receiving pensions, approximately 20 per cent were blind from trachoma, trachoma being the greatest single cause of blindness.

I cannot agree with the food deficiency theory of the cause of trachoma. Obviously it is quite impossible to establish a group of individuals for study and place them upon a well balanced diet to see if they will develop trachoma while being properly fed. However, we have done considerable work at Rolla with high vitamin and well balanced diets and are unable to see that feeding has any effect upon the progress of trachoma cases under treatment.

Certainly, when one considers that trachoma is a very common disease among professional wrestlers, it is hard to reconcile the food deficiency theory with this finding. The professional wrestler is certainly not an individual suffering from lack of food or any particular vitamin.

TRANSVERSE RUPTURE OF THE AORTA*

RELATIONSHIP TO SUDDEN DEATH WITH THEORIES CONCERNING THE ETIOLOGY AND MECHANICS OF ITS OCCURRENCE

By JACK CLAYTON NORRIS, M.D.,
Atlanta, Georgia

Transverse rupture of the aorta is an uncommon accident. We have seen five such lesions in 1,461 necropsies. It is eminently fatal and seldom diagnosed prior to exitus. According to Lifvendahl,[1] cases have been reported by Riley, Paschkis, Oppenheim, Busse, Bohnen, Suss, Gallaher, Maitland, and Loffler. In those reports the ages of the patients varied from 16 to 53 years. The ruptures occurred at a point usually about 2 cm. above the aortic cusps. Lifvendahl reported three cases. This paper presents four additional ones.

Etiology.—Lifvendahl emphasized arteriosclerosis of the aorta and an increased blood pressure as the underlying cause of rupture. Likewise he mentioned as causes nephritis, coarctation, syphilitic meso-aortitis, and trauma. In our cases there were several factors involved: (a) atherosclerosis, (b) elevated blood pressure, and (c) hypoplasia with thinning of the wall and narrowing of the aortic lumen.

Sites of Rupture.—In each instance the tear occurred in an area approximately 2.0 to 2.5 cm. above the cusps. Two aortas had vertical slits, beginning at the base behind the valves, opened upward, and then torn at right angles, forming an angular opening. As nearly as could be determined, the split occurred in that portion of the aorta adjacent to and just above and lateral to the right auricular appendage. This anatomical site is in the first part of the aortic curvature.

Pathology and Mechanics of Occurrence.—At each necropsy in this series it was revealed that an unmistakble, yet variable, degenerative change of the aorta appearing as slightly elevated, irregular, yellowish areas existed. There was little evidence of calcification. The muscle of each heart was thickened and hypertrophied and the coronary changes were similar to those in the aorta. There was no evidence of syphilitic aortitis. In one instance we found an added factor, a hypoplastic aortic wall. The intima and media were very thin, like parchment, and the aortic lumen was narrow.

I believe the process of rupture begins in a small area of degeneration in the aortic wall at a point where the propelled blood exerts its greatest aortic pressure. This site is found to be approximately 2.0 to 2.5 cm. above the cusps. Here the diseased aorta is subjected to much strain and trauma because of its mechanical nature. The aorta expands to receive incoming blood; it then contracts to force the blood into the general circulation. To this aortic action there may be an added pressure, which occurs at the moment the incoming mitral blood meets the sustained aortic blood. These facts assure us of the tremendous pressure at the base. Therefore, the diseased wall would eventually weaken and an increased blood pressure, especially if elevated to abnormal degrees by lifting, for example, would probably cause a rupture.

CASE REPORTS

A male (T. G.), aged forty, had complained of headache and nose bleed for several months. Upon returning home after the completion of the day's work, he became unconscious following cardiac pain and died on the way to the hospital.

Another patient (J. T.), aged forty-one, was admitted in a state of shock. His body was cool and clammy and cyanosis was marked. His pulse was imperceptible. The heart tones were barely audible. The ventricular rate was forty-eight per minute. He lived only eight hours after the onset of symptoms.

A third patient was a young female, aged thirty-two years (J. B.). She was four months pregnant. Her record showed that in 1930 she had a blood pressure of 180/120. She also had shortness of breath and the physical examination disclosed an enlarged heart. She came to Grady Hospital on August 23, 1932, nearly two years later, and on this admission stated that she had noted "spots before her eyes" and peculiar cramping pains; also, at this time, her left arm felt as though it were numb. She had an asthmatic type of breathing. Her blood pressure was 170/120. During the night she stated that she had a terrible, tearing, almost unbearable pain that radiated between the shoulder blades and down both arms. Atropine and morphia gave some relief, but at 6:55 a. m. she became unconscious and soon died.

The fourth heart studied was that of a patient (J. W.), aged forty-one years, admitted on October 25, who died suddenly on October 27. He was complaining of chest pain, dyspnea and weakness of the left leg. He was entirely well until October 25. On this date he arose early and while drawing a bucket of water from a well experienced a "vise-like pain," beginning at the right side of the neck and extending across the chest to the left breast, and then downward to the left hip. He stated that the pain resembled a "tearing sensation." He soon felt weak and dizzy and had a "cold sweat." Later the pain relaxed and he was able to eat breakfast. On attempting to proceed to his

*Received for publication April 18, 1934.

*From the Department of Pathology, Emory University, Grady Hospital.

work, the pain returned and in addition his left leg became dead and numb, "drawing up under him."

His past history was essentially negative. He had never had gonorrhea or chancre. He was a worker in a coal yard.

The physical examination revealed a well developed and well nourished body. The blood pressure was 160/94 in each arm. The pulse rate was 80 per minute and temperature 98°. He had to lie in an elevated bed. He complained of severe pain. The heart was enlarged 11 cm. to the left and 4 cm. to the right. Later, percussion revealed an increased post-manubrial dullness. Auscultation transmitted only poor muscular tones with a soft systolic murmur at the apex. There was slight muscular weakness of both arms. The left leg was cooler to the feel than the right. The femoral and arterial pulsations were absent. The eye grounds revealed a moderate arteriosclerosis.

The necropsy revealed the pericardium filled with b'ood, fluid and clotted. The heart weighed 820 grams and there was a left muscular wall thickness of 4 cm. There was a transverse tear in the aortic wall 2.5 cm. above the valves. The blood had dissected the abdominal aorta and below both iliacs. A clot formed between the adventitia and media of the left iliac at a point just below the iliac crest, large enough to occlude the leg artery by compression. He had a generalized Grade II arteriosclerosis without calcification. The tremendous cardiac enlargement presupposes a very high blood pressure.

Autopsy Findings.—In four instances the pericardial cavity was distended with clotted and free blood. The blood had extravasated through the tunica intima and media, beneath the adventitia and then had escaped into the pericardial sac, and in one instance there were 750 c. c. and in another 550 c. c. c. In another, blood had transuded into the chest cavities. In two patients the blood dissected the entire aorta. These patients had more sclerosis than the others, and in one the coronary was practically occluded. There was usually an accompanying pulmonary edema and blood in the lung adventitia.

Discussion and Differential Diagnosis.—The patients in our series were under the age of 45 years, each with elevated blood pressure. An analysis of the symptoms indicates the diagnosis of ruptured aorta to depend upon a group of variable symptoms. There may be sudden, severe cardiac and chest pain of an anginal type often occurring simultaneously with some sort of precipitate bodily strain, such as lifting heavy objects. Shortly after the angina, cyanosis occurs, quickly followed by dyspnea. The patient soon becomes cool, the skin often is clammy to touch, and a state of shock exists. The symptoms are often "stormy," and may increase in severity during the following hours, and large doses of morphine are needed for comfort. The physical examination will usually disclose a rapid pulse, an increase in cardiac dullness (hemopericardium) and a blood pressure drop.

The accident is most often confused with angina pectoris simplex. The cardiogram will usually rule out a coronary occlusion. In angina simplex there is usually symptomatic relief following morphia or nitrates, while in rupture such treatment is of little value. In acute pneumothorax the heart displacement, rapid pulse and x-ray will differentiate the diseases. Acute pericarditis is usually accompanied by fever. Rupture of the heart wall can hardly be differentiated unless it has been previously known that muscle aneurysm existed. Acute rupture of the aortic valve leaflets may be distinguished by the drop in diastolic pressure, the murmur, the pulse, the extreme dyspnea and orthopnea, often associated with nausea and vomiting.

Sudden death may occur, but as a rule the victim lives many hours after the tear, and in some instances may live several days. It is an impression that death results largely from the pericardial tamponade, loss of blood and shock; added to these factors is the resultant cardiac embarrassment as observed in the patient with bradycardia. The treatment is obviously symptomatic.

BIBLIOGRAPHY

1. Lifvendahl, R. H.: Spontaneous Rupture of the Aorta. Arch. Pathol., **8**:206-212, Aug., 1929.
2. Narr, Fred C.; and Wells, Arthur H.: Rupture of the Aorta. Amer. Heart Jour., **8**:834, Aug., 1933.

TEACHING BACTERIOLOGY AS A PART OF THE FUNCTION OF THE DEPARTMENT OF MEDICINE*

By David T. Smith, M.D.,†
Durham, North Carolina

Grave and serious criticisms are frequently heard concerning the way bacteriology is taught in medical schools. From the students, one hears that bacteriology is a dead course and too often it is actually presented in a deadly manner. From the clinicians, grumblings emanate that the student, despite his knowledge of fermentation tables, Gram specificities, and so

*Read in Section on Medical Education, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

†Professor of Bacteriology and Associate Professor of Medicine, Duke University School of Medicine.

on, has not a bacteriological approach to clinical problems. The men who planned the curriculum at the Duke Medical School, realizing the tenability of many of the criticisms, attempted to obviate these difficulties by prescribing the teaching of bacteriology as a function of the Department of Medicine. This does not imply an elimination of a Department of Bacteriology, but rather a coordination of the two departments. This is accomplished by appointing as the head of the Department of Bacteriology an associate professor of medicine; at the present time, this member is one of the visiting physicians of Duke Hospital whose primary interest lies in the infectious diseases. The instructors include physicians who may have appointments on the clinical staff or those who are engaged primarily in research in bacteriology. The Professor's assistant has charge of the biological Division of the Hospital and thus is able to present first-hand methods of approach to bacteriological problems to the students. Under this organization, there is probably no economy of staff, but duplication of teaching as well as bacteriological equipment is prevented.

The course in bacteriology of the Duke Medical School is taught in the autumn quarter of the second year after the completion of anatomy, histology, biochemistry, physiology and pharmacology. Clinical microscopy runs concurrently with bacteriology and pathology begins one month after bacteriology. Bacteriology occupies three mornings a week for nine weeks. The lectures are given from 8:30 to 9:30 a. m., the laboratory period lasting from 9:30 a. m. to 12:30 p. m. This allows twenty-seven hours for lectures and eighty-one hours for laboratory work, or a total of one hundred and eight hours for the course. Most of the students spend more time than this, for they are encouraged to watch the development of their cultures day by day.

This original course of one hundred and eight hours is supplemented by a seminar or conference course of one hour a week for ten weeks in the winter quarter when the newer developments in bacteriology are discussed. Although this course is elective, by far the great majority of the students enroll for this course.

There is no didactic teaching of bacteriology during the clinical years; but each clinical clerk follows the bacteriology of his cases, performing as much of the work as is feasible under the direction of the ward instructor. The scope of the laboratory course is reasonably wide and acquaints the student with all the methods and procedures employed in bacteriological laboratories.

The laboratory course in bacteriology opens with the colon-typhoid-dysentery group because these organisms grow readily, have characteristic colonies, give clear-cut sugar fermentations, agglutinations and precipitin reactions. Tests with unknown organisms are distributed at intervals throughout the course rather than being left for the final examination. These tests are used as a method of teaching rather than as a test of the student's knowledge. Most of the lecture time is devoted to the immunological and epidemiological aspects of infection. We are especially interested in the student's having a clear conception of (1) how organisms gain entrance to the body, (2) the type of poisons they produce, (3) the nature of immune bodies which are produced by the host, and (4) the methods of preventing the disease by active and passive immunization.

The results have been fairly satisfactory. The students who have gone forward to the wards seem well prepared to go on with the study of the immunological aspects of infectious diseases. Grades are always poor indications of real values, but *Table 1* shows that the Duke students have compared favorably with students from other schools in the results of the National Board examinations in bacteriology.

Table 1

BACTERIOLOGY

NATIONAL BOARD GRADES

	Duke Students	Other Students
Number	109	907
High	99	99
Low	62	34
Average	84.08	81.55

Discussion follows paper of Dr. Muckenfuss, page 737.

THE TEACHING OF BACTERIOLOGY IN A DEPARTMENT OF MEDICINE*

By RALPH S. MUCKENFUSS, M.D.,
St. Louis, Missouri

Since bacteriological methods must be used in the diagnosis and care of infectious disease, teaching of bacteriology in a department of medicine must be for the most part practical and with the constant aim of preparing men to

*Read in Section on Medical Education, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

*From the Department of Internal Medicine, Washington University School of Medicine.

cope with clinical problems. Only a small part of the immense field can be covered and the correct selection of subject matter forms one of the chief essentials of teaching. Of prime importance is the consideration of the future needs of the average student.

In the report of the Commission on Medical Education, it is stated that 77 per cent of physicians are engaged in general practice or are only partial specialists. Among recent graduates only 15.2 to 17.6 per cent occupy full-time salaried positions; the remainder are dependent either wholly or in part on some form of practice. When, however, the type of practice engaged in by recent graduates is examined, it is seen that 36.1 per cent of the graduates of the year 1920 limit their practice to a specialty, and that 53.7 per cent of those specializing had no previous experience in general practice.

From these figures it may be assumed that teaching must be planned to prepare 65 per cent of the students for general practice and 35 per cent for training preliminary to specialization.

If bacteriology is to be taught solely for the care of those diseases requiring isolation, which constitute about 5 per cent of the calls of a general practitioner, there is little justification for spending a great deal of time in teaching this subject. When, however, this list is extended to include such conditions as venereal diseases, upper respiratory and throat infections, tuberculosis, vaccinations and inoculations, it is seen that a training in bacteriology will be found applicable in about 35 per cent of the calls of a general practitioner. It would not be profitable to attempt an analysis similar to this for each of the common specialties, but it can safely be stated that infections form an important part in most of them.

Although it is impossible to predict the future trends of medical practice, these figures make it clear that most medical graduates will find themselves in constant need of a knowledge of the principles of bacteriology and immunity, and of a working knowledge of the diagnostic methods in common use.

It is self-evident that each man engaged in the practice of medicine cannot be skilled in all the methods of growing and identifying bacteria, or in the serological methods in use in diagnosis. It is equally obvious that if he is to use these methods intelligently, a knowledge of the underlying principles is necessary, which implies a knowledge of the limitations and sources of error for each test. This applies equally to procedures as widely different as the Wassermann reaction and an examination of sputum for tubercle bacilli.

It has seemed wise to build the teaching of bacteriology in the Department of Medicine of Washington University on the cases seen in the teaching hospitals. The details by which this plan is being developed are influenced by local conditions, but the method is generally applicable.

In the teaching of undergraduates, the patients in Barnes Hospital and in the St. Louis City Isolation Hospital have been available. The general plan followed in this teaching has been to make the student familiarize himself with the essential clinical features of the disease, then to discuss briefly the treatment, the method of spread and the means of control. Following this, the laboratory data are taken up in some detail, and when possible each student carries out the procedures himself. Emphasis is always placed on the principle underlying each clinical test, and on the interpretation, bearing in mind always the limitations and sources of error. The amount of work that the students can do personally must, naturally, depend upon the nature of the disease being discussed, but the collection of satisfactory material for laboratory examination is emphasized and the procedure in the laboratory reviewed. The completeness of this teaching varies necessarily with the time available, the size of the groups, and the nature of the clinical material.

Some of the students develop a special interest in bacteriology, and a limited number can be accommodated in the laboratory. The work thus done is extra curricular, and it has been required that the problem for study be carefully outlined, the literature adequately reviewed, and the work carried to some definite conclusion if the available time permits. At the termination of the work a report is written and the work is criticized, and the lines along which further investigation might be pursued are suggested. It is made clear at the outset that work done in this way is for the student's benefit and training, and that only occasionally can such work be carried to a point that justifies publication.

Special attention is devoted to the teaching of that limited number of graduates who become medical interns in Barnes Hospital. Each of these men spends a part of his term of service in the St. Louis City Isolation Hospital and a part of his service in the diagnostic laboratory, where he is given some routine duties and is familiarized with the routine methods of bacteriology and serology as conducted for diagnostic purposes.

Provision is made for one man, following his internship, to spend a period of one or two years in the laboratory as a research assistant. In addition to investigation, he must become skilled in the routine procedures, assist in the teaching of infectious diseases, and at times serve as acting director of the laboratory.

It is essential for those doing advanced work that the training shall not be entirely from the clinical viewpoint, and in this connection it is impossible to overestimate the value of the close association existing between the Departments of Bacteriology and Medicine. Active participation in the weekly seminars of the Department of Bacteriology is expected. The willingness of the Professor of Bacteriology, Dr. J. J. Bronfenbrenner, to advise at all times has been invaluable in making well rounded training possible.

DISCUSSION *(Abstract)*

Papers of Dr. Smith and Dr. Muckenfuss.

Dr. Kenneth F. Maxcy, University, Va.—Equally cogent reasons can be advanced for a separate department of bacteriology and immunology or for combining these subjects with pathology, with clinical medicine or with preventive medicine. The best arrangement will depend in the last analysis upon faculty and administrative considerations in each individual medical school. So long as adequate provision be made for an interested and competent teaching staff, adequate equipment and budget, and sufficient time in the curriculum, it makes little difference where they are placed.

I agree with Dr. Smith that the days of the classical approach with stock cultures and stereotyped descriptive procedures are over. The subject is made much more interesting and stimulating if the student is given unknown cultures to work out and if he deals with material taken directly from human sources. On the other hand, I can see some slight risk from too early an introduction to routine procedures of the bacteriological diagnostic laboratory. I want to emphasize the word *routine*, the curse of all laboratories. "Routine" tends to stifle interest. Laboratory procedures become an end in themselves rather than a means to understanding the nature of the illness of a human being. More and more hospitals tend to leave bacteriological and serological diagnosis to routine procedures, done by more or less dogmatically trained technicians. To a corresponding degree the full possibilities of help from this source are denied to the clinician. The work of a bacteriological diagnostic laboratory can never rise above the level of bacteriological interest and knowledge of the physician or physicians who are responsible for its existence.

At the University of Virginia, where bacteriology is combined with preventive medicine, our methods of teaching are essentially similar to those reported by Dr. Smith. The student is encouraged to recover and identify unknown organisms from mixed cultures and from human material. The methods of bacteriology are taught on the basis of practical diagnostic laboratory procedures. Our emphasis is upon learning to do a few common medical procedures thoroughly, and how to adapt them to an understanding of the pathogenesis of disease rather than to give the student a superficial acquaintance with the whole field of micro-parasitology, or with many diseases which he may never encounter.

Dr. Russell H. Oppenheimer, Emory University, Ga.—The placement of instruction in all clinical pathology as well as bacteriology in the Department of Pathology or the Department of Medicine seems to depend largely upon the organization of the school.

There are, roughly, two phases of this work: one is that of research; the other, the practical application to clinical medicine. Which of these two fields of activity is the more important depends of course upon one's viewpoint. However, so far as the student is concerned, our interest is primarily with instruction in the use of pathology as an aid in the diagnosis and treatment of patients. Whether this purpose can adequately be served by the Department of Pathology will naturally depend upon its intimacy of relation with the clinical field in any given school. We have had many discussions about bridging the gap between the clinical and preclinical years. It does not seem there could be any better bridge than to have the individuals concerned work together for a mutual goal.

In our own school the relationship between the Department of Pathology, which includes bacteriology, and the clinical branches is very friendly and intimate. Those responsible for clinical pathology and bacteriology not only receive material from clinicians and send reports on examinations made at their request, but see patients and consult with the clinicians as to the most effective manner of applying the facilities of the laboratory in the study of them. Many useful results arise from such a relationship. Thus, the clinician seeks advice from the laboratory and gains a clearer conception of what the laboratory can do to help him. The pathologist and bacteriologist learn something of the viewpoint of the clinician, keep fresh by actual contact with the patient, and are better able

to evaluate the efficiency of their department. Again, the pathologist has available a wider and more selective source of material about which he is well informed to use in the instruction of his classes, as a result of which classroom instruction has that enlivening and interesting quality which is attached to the study of disease *in vivo* rather than *in vitro*. Furthermore, as a result of contact with the patient and clinician, problems of research present themselves which may extend the opportunity for departmental endeavor.

Under conditions such as these it is probable that bacteriology as well as other forms of clinical pathology can best be taught in the Department of Bacteriology or Pathology rather than as a division of the Department of Medicine.

CLASSICAL CESAREAN SECTION FOR FULMINATING ECLAMPSIA, WITH SUBARACHNOID HEMORRHAGE AND PYELITIS*

By GREER BAUGHMAN, M.D., F.A.C.S.,
Richmond, Virginia

Mrs. C. G., white, aged 28, married, gravida 1, para 0, had an essentially negative family history except that her mother had been insane for twenty years.

The patient had had headaches once a month for three years, no history of kidney trouble, scarlet fever, diphtheria or pyelitis.

Her height was five feet five and three-quarter inches, weight 157 pounds.

She had been pregnant for about six and a half months.

January 11, 1933, she was examined in the office of her physician, who had been seeing her regularly during her pregnancy. He found a normal blood pressure, urine free from albumin and casts and no history that would suggest the approach of serious trouble, except that she had been having mild headaches about once a month for three years.

January 28, 1933, at 2:00 a. m. she awakened with a severe headache, though she had been feeling perfectly well up to and including the day before. Her physician visited her before his morning office hours and found her blood pressure 190/90, the urine loaded with albumin and the patient very edematous. By 2:00 p. m. her blood pressure, in spite of treatment, had risen to 200/90 and she was becoming comatose.

At 2:00 p. m. she was brought to the hospital in an ambulance. She did not respond to questions, was twitching, the blood pressure was 185/100, catheterized urine showed heavy albumin, much blood, many granular and hyaline casts; the fundi of her eyes were normal, the pupils sluggish but equal to light (report by Dr. C. M. Miller). Dr. C. C. Coleman examined her at 7:30 p. m. and regarded the case as one of toxemia of pregnancy without focal symptoms. She had two slight convulsions during the day.

She received morphine sulphate ¼ grain with atropine sulphate 1/150 by hypodermic upon entering the hospital. Colonic irrigation was followed by low gravity of glucose 1 per cent with bromide of soda grains 30, and gastric lavage through the nose, leaving in the stomach three ounces of concentrated magnesium sulphate. Record was requested of the outgo and intake of fluids and blood chemical analysis. Cream of tartar lemonade ad libidum was ordered.

January 29, 1933, found the patient rational, her blood pressure falling with the low point 144/80. Intake of fluids was 26 ounces, outgo 20; blood nonprotein nitrogen 38, urea nitrogen 17.9, uric acid 4.2, carbon dioxide combining power 69.2, blood sugar 103, calcium 7.8. The urine was about the same, the eyeground veins of the right retina were slightly fuller than the left, she had had six slight convulsions, and was more comatose in the evening.

January 30, 1933, showed the blood pressure rising, particularly the diastolic, with the high point 180/118. She could not be aroused to take fluids so they were given by nasal tube. The fetal heart was good at 155.

The patient was becoming more toxic, as evidenced by the deepening of coma and the fact that she took nothing voluntarily by mouth. Her blood pressure and the blood nitrogen fractions were rising and fluid output, in spite of very active treatment, was reduced. She had a long cervix. It was decided to do a classical cesarean section under spinal anesthesia.

At 4:10 p. m. a section was performed under spinal anesthesia and a six and a half months premature live baby weighing one pound and four ounces, 32 cm. long but vigorous was extracted. When the spinal fluid was removed before injecting the novocaine it was distinctly bloody. The laboratory report on the spinal fluid showed globulin plus 4, cell count 171, color red and cloudy.

At 5:30 p. m. a neurological examination made by Dr. C. C. Coleman showed slight weakness of the upper seventh nerve and the lower part of the face on the right and slight increase of the right elbow jerk. The lower reflexes were discounted as the patient had not yet recovered from the spinal anesthesia. The discs were normal and extra-ocular muscles were also normal. It was believed that the patient might have a subarachnoid hemorrhage.

By 9:00 p. m. the patient's condition was much improved. Her blood pressure was 156/90, the output of urine 4 ounces, intake by mouth 15 ounces and 100 c. c. by vein. Glucose 1 per cent by low gravity was continued, catheterization and irrigation of the bladder were to be continued if the patient could not void. After operation 100 c. c. of 50 per cent glucose by vein and pantopon 1/3 by hypodermic as necessary were given. A sand bag was kept on the abdomen, digifolin 1 ampoule by hypodermic before operation and one after operation were given.

January 31, 1933, found the patient more somnolent and spinal tap was more bloody than the day before. Her neck was definitely stiff, the right eye remained

*Case Report, Section Clinic, Joint Session, Section on Obstetrics and Section on Gynecology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

only three-quarters closed, while the left eye was tightly closed. Blood pressure was 170/110. Twenty-one ounces of urine were excreted. Fluid intake was 151 ounces.

Digifolin 1 ampoule by hypodermic every six hours was continued. Low gravity of 1 per cent glucose was continued and 100 c. c. of 50 per cent glucose solution were given by vein. Gastric lavage with soda solution by nose, dilaudid 1/32 instead of pantopon were given and cream of tartar lemonade was continued through the nasal tube.

February 1, 1933, found the patient much better. The neurological findings were about the same except that towards night the neck was stiffer and the urine showed less blood and casts. Intake of fluids was 39 ounces by stomach and 100 c. c. by vein; outgo 39 ounces.

The patient continued to improve in every way except that the neurological findings remained the same.

February 6, 1933, showed an improvement in the neurological findings except for headache and stiffness about the neck.

February 7, the temperature rose to 101.4° with symptoms and urinary findings of pyelitis.

February 10 the spinal puncture showed clear lemon colored fluid, pressure normal, cell count 76, 24 neutrophils, 76 lymphocytes, and blood culture and the Wassermann test were negative.

February 15, the patient left the hospital with blood pressure 138/92 and except for headaches no neurological symptoms. Analysis of a catheterized specimen of urine showed a few blood cells and a few clumps of pus, no casts, a trace of albumin.

March 29, 1933, a report by her physician indicated that the blood pressure had been no higher than 140/100 and now was 100/60. The urine has been free of albumin and casts and has a few clumped pus cells. She feels well but weak, but she continues to have a headache almost every night.

The premature baby weighing one pound four ounces died January 31, 1933.

November 9, 1933, an examination was made of the patient. She had had only three severe headaches since April 17, 1933, but still complained of slight headaches at the time of her menstruation as she had done previous to her pregnancy. She missed one month and was curetted by her physician July 11, 1933.

Her weight is 152.5 pounds, blood pressure 122/80 and hemoglobin 80 per cent. The reflexes are normal. Catheterized urine shows: specific gravity 1.024, acid, trace of albumin and a few pus cells occasionally clumped.

Kidney function:

First half hour	160 c. c.—42	per cent
Second half hour	260 c. c.—16	per cent
Third half hour	340 c. c.— 7	per cent
Fourth half hour	330 c. c.— 4.5	per cent
Total	1036 c. c.—69.5	per cent

Southern Medical Journal

JOURNAL OF THE

SOUTHERN MEDICAL ASSOCIATION

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Ala. Annual subscription $4.00. Single copies 35c each.

Entered as second-class matter at the Post Office at Birmingham, Ala., under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1106, Act of October 3, 1917, authorized December 20, 1921.

M. Y. DABNEY, M.D., Editor
EUGENIA B. DABNEY, M.S., Assistant Editor
C. P. LORANZ, Secretary-Manager

Volume 27 AUGUST 1934 Number 8

EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Eighth Annual Meeting
San Antonio, Texas, November 13-16, 1934

THE SAN ANTONIO MEETING

Plans for the twenty-eighth convention of the Southern Medical Association in San Antonio are going forward apace. The President for this year, Dr. Hugh Leslie Moore, Dallas, is conveniently near to the seat of arrangements. The profession of San Antonio and of Texas are cooperating interestedly to provide an instructive program. Three special state organizations, the Texas Pediatric Society, the Texas Dermatological Society and the Texas Ophthalmological and Otolaryngological Society, will meet simultaneously with the Southern Medical Association. Four national qualifying boards, those of ophthalmology, otolaryngology, pediatrics, and dermatology and syphilology, have chosen the Southern Medical meeting for their next examinations. An extensive clinical program is being planned in cooperation with the state groups for the opening day. On the opening night, Tuesday, when President Moore delivers his address, the presidents of the American Medical Association, of the Pan-American Medical Association, and of the National Academy of Medicine of Mexico will bring words of greeting.

The Dallas meeting in 1925 was the largest in the Association's history. The State of Texas is capable of attracting a large group of the medical profession. Physicians from neighboring sections and from the more remote Atlantic seaboard section of the South, who may not make the trip to the Southwest frequently, are fortunate in having this opportunity to visit the Lone Star State. The southern section of Texas in which San Antonio is situated is the oldest settled and contains many sites of historic interest. San Antonio itself was founded as a Spanish mission in 1718.

There will be the added pleasure of a post-convention trip to Mexico City, the magnificent home of the Aztec Emperors, under the auspices of the Association, with companions and under circumstances which cannot again soon be duplicated. In planning your summer vacation, do not forget that a rare opportunity will come in November to see the historic places of the Southwest, to see Texas, and to visit a little known neighboring country, with a delightful group of professional associates.

SUDDEN EMPTYING OF THE DISTENDED URINARY BLADDER

One of the most generally accepted working hypotheses of urology is the tenet that sudden emptying of a distended bladder is very dangerous to the patient and may result in his death. Various technics are described to ensure gradual relief of acute distention, to supply boric acid as urine is removed, and to empty the bladder over a period of days.[1] Sudden emptying is believed to result in dangerous bleeding, which is caused by an increase in intravesical tension.[2]

According to Creevy,[2] of Minneapolis, gradual emptying of the bladder does not protect against bleeding. The lesions of experimental acute retention in dogs are strikingly similar to those which have been attributed by many writers to sudden emptying of a chronically distended bladder. The pathologic effects commonly believed to result from sudden emptying of the bladder are merely the result of the distention,[2]

1. Lowsley, O. S.; and Kirwin, T. J.: Text-book of Urology. Philadelphia: Lea & Febiger, 1926.

2. Creevy, C. D.: Distention of the Urinary Bladder: I. Hematuria and Sudden Emptying; An Experimental and Clinical Study. Arch. Surg., **28**:948, May, 1934.

and have nothing to do with the time consumed in its relief. Hemorrhages, hematuria, renal insufficiency and suppression of urine are characteristics of acute distention of the bladder. They are also seen in acute pyelonephritis. Bleeding often follows catheterization of a patient with chronic partial urinary retention, and is frequent after the gentlest ureteral manipulation in a patient with prostatic obstruction.

Acute retention was produced by Creevy in dogs by ligation of the urethra. He reports that retention interfered with venous return from the urinary tract, which increased the pressure. The blood stream thus was unable to carry away waste products. The effect was first seen in the bladder, where it led to hemorrhage and necrosis in the area of poorest blood supply. The upper urinary tract was at first protected by the tendency of the bladder to relax because there was no reflux of the urine into the ureters. Within two days after retention was established the bladder pressure was elevated. The kidney and ureter pressure later rose and became sufficiently high to impair their own blood supply. Increase of pressure was the critical factor which led to injury of the bladder wall, and it was in some cases quite independent of the volume of urine. Venous stasis and hemorrhages into the upper urinary tract led to impairment of renal function after a latent period of twenty-four hours. Sudden relief of obstruction did not produce any specific lesions, but on the contrary led to recovery.

In a small group of patients with retention due to prostatism, ill effects, Creevy says, did not follow sudden withdrawal of urine by catheter or by cystostomy. Patients of this type who die after catheterization, according to Creevy, die of infection. Gradual emptying does not reduce the percentage of infective lesions or improve the mortality rate. It is unnecessary to assume that sudden emptying of the bladder is responsible for the bleeding which often follows.

Much more work would of course be necessary to dethrone the principle of gradual emptying. Certainly no harm has been attributed to it. Creevy's experiments serve as a reminder that no therapeutic method or operative technic is above suspicion. All should be critically, perhaps even with hostility examined, each time they are employed.

GLEANINGS FROM RECENT JOURNALS

Fat Metabolism and Vitamin A.—The blood serum contains an enzyme, esterase, which has to do with the assimilation of fats. It is also found in various tissues and perhaps the esterase of the blood represents merely a spill from the tissues.

Esterase appears to be closely related to blood complement. It is claimed by some to be identical with it. The amount of complement has varied with the amount of esterase in a number of experimental studies.[1] Complement of course is intimately concerned in immune reactions and in defense against infectious organisms. To those who have called vitamin A an anti-infective agent, this suggested identity of serum complement and esterase, and the fact that esterase is reduced in vitamin A deficiency, are significant.

Green, of Sheffield, England, who has extensively studied fat metabolism, reports a large and progressive decrease in the esterase of the blood serum during vitamin A deficiency. He notes also, however, that infected animals on a complete diet, with adequate vitamin A, show a fall in serum esterase. During vitamin B deficiency esterase fell very slightly. Relatively large amounts of cod liver oil in the dietary or of fat produced a rise in the serum esterase above normal. He noted a change in the quality of the liver fat during vitamin A deficiency.

The studies are of interest as emphasizing the relationship of the fat soluble vitamin A to fat metabolism, and one of the signs of vitamin A deficiency, a lowered serum esterase.

Experimental Elephantiasis. — The lymphatic system repairs itself with remarkable speed if the vessels are severed surgically. Swelling of a limb in which practically every vessel has been cut occurs, but in a very few days subsides, and on examination the circulation of the lymph will be found to have re-established itself.[3] In the tropics elephantiasis, a disease in which the lymphatics are obstructed, occurs with some frequency. Drinker, Field, and Homans,[3] of Harvard, have succeeded in producing it experimentally in a Northern climate by a milder irri-

1. Green, Harry N.: Fat Metabolism in Vitamin A Deficiency: The Blood Serum Esterase. Biochem. Jour., **28**:16, 1934.

2. The Utilization of Fat and the Desaturation of Fat in the Liver. Ibid., p. 25.

3. Drinker, C. K.; Field, M. E.; and Homans, J.: Experimental Production of Edema and Elephantiasis as a Result of Lymphatic Obstruction. Amer. Jour. Physiol., **108**:509, June, 1934.

tation of the lymph vessels. Repeated central cannulation of the lymph trunks and injection of suspensions of crystalline silica and quinine hydrochloride solution resulted after a time in lymphedema with a notable collection of edema fluid. The subcutaneous connective tissue increased and the leg gradually became elephantiatic. The swollen part was then susceptible to attacks of acute infection, and a hemolytic streptococcus was isolated from the edema fluid during the acute attacks. Between attacks it was not to be found. They note that it is difficult to infect normal dogs with a streptococcus.

Gradual slight injury to the lymphatics thus apparently produced a severe tropical disease, not previously induced in the laboratory.

Physical Therapy and Bone Atrophy.—Roentgen studies of normal bones which have been immobilized show atrophy in a short time, according to Key,[1] of St. Louis, and his co-workers. The picture resembles that observed after fractures and operations on the extremities, which is often ascribed to the injury or operation rather than to disuse. They have studied the effect of immobilization of normal human limbs. Their subjects were patients who were in the hospital for a disease of the upper extremities, and whose lower extremities were normal. Casts were applied to both normal lower limbs. Atrophy was detected in roentgenograms four weeks after the immobilization began. It was progressive, and was apparently increased by the presence of infection, though normal bone might simultaneously be forming.

Physical therapy has in the past fifteen years assumed an important place in the armamentarium of physicians, these investigators note. Actual evaluation of it is quite difficult. They have studied its effects by immobilizing the normal lower extremities of ten hospitalized patients. One extremity of each individual was used as control; the other was treated by baking, massage, or exercise, to determine whether the previously observed bone atrophy was preventable by any one of these measures. Atrophy of bone occurred in all the feet which were immobilized, regardless of physical therapy. Heat, massage, and active exercise had little if any effect on the local atrophy which was noted when the extremities were immobilized in a plaster of paris cast. Their work offers food for thought, and for study in a larger group of cases.

1. Key, J. Albert; Fisher, F.; and Elzinga, E.: Local Atrophy of Bone. Arch. Surg., **28**:936-948, May, 1934.

Diagnosis of Tumor of the Suprarenal Cortex.—Widespread clinical trial of the pituitary and gonadal sex hormones over the past few years have resulted rather disappointingly so far as therapy is concerned. No specific syndrome has been defined in which the commercial preparations are undoubtedly indicated.[1]

The outstanding diagnostic value of the pregnancy tests is undisputed, and in the clinical diagnostic field other possibilities of hormone tests are coming to light. Their importance in the rather rare diseases, hydatid mole and chorionepithelioma, is acknowledged.

Robert Frank,[2] long known for his early work on the ovarian follicle hormone, reports two suprarenal cortical carcinomas in which great quantities of estrin appeared in the urine. The quantity excreted, he says, was as great as in normal pregnancy. Metastases to the liver of one of the patients were extracted and yielded the hormone. The clinical symptoms resembled those described by Cushing as due to a basophilic pituitary tumor. Frank suggests the possible value of the estrin test in early diagnosis of tumor of the suprarenal cortex. Tumors of this type are infrequently seen. It will doubtless be of interest to those who encounter one to repeat Frank's studies.

TWENTY-FIVE YEARS AGO

FROM JOURNALS OF 1909

Harmful Effects of Acetanilid, Antipyrine, and Phenacetin.[3]—"One of the most interesting and, for physicians, most instructive bulletins published by the Bureau of Chemistry at Washington has recently been issued on 'The Harmful Effects of Acetanilid, Antipyrines and Phenacetin.' * * * 'The harm done by acetanilid does not result from its proper use under the direction of the physician, but is mainly the result of the promiscuous and indiscriminate use of the product by the laity.'"

New Psychiatric Ward.[4]—"Plans have been completed for the new psychiatric ward given to Johns Hopkins Hospital by Mr. Henry Phipps, of New York City. The building will be of dark brick and stone * * * The idea of

1. Annual Reprint of the Reports of the Council on Pharmacy and Chemistry of the American Medical Association. Chicago: Press of the A.M.A., 1933.

2. Frank, Robert: A Suggested Test for Functional Cortical Adrenal Tumor. Proc. Soc. Exper. Biol. & Med., **31**:1204, June, 1934.

3. Editorial, J.A.M.A., **53**:303, 1909.

4. Maryland News. Ibid, p. 465.

non-restraint will be carried out as far as possible. Windows will be guarded by flower boxes and trellises instead of bars, and suitable arrangements for recreation and exercise will be supplied."

Science and Practice.[1]—"Among the objects [of the constitution which you have adopted] is the cultivation of clinical research by the methods of the natural sciences. * * * The constitution does not keep you down exclusively to science, but let me tell you: beware of practice. It is a bewitching graveyard in which many a brain has been buried alive with no other compensation than a gilded tombstone."

Tonsils.[2]—"After the age of six or eight years, when the function of the tonsil begins to disappear, the general condition of health is invariably improved by the removal of the gland. It is a common occurrence for these patients to gain one or two pounds a week after removal of the gland."

1. Meltzer, S. J.: The Science of Clinical Medicine. J.A.M.A., **53**:512, 1909.
2. Robertson, C. M.: Anatomy and Physiology of the Tonsil. J.A.M.A., **53**:689, 1909.

San Antonio, Where We Meet

THE ALAMO, "SHRINE OF TEXAS LIBERTY"*

"The siege and fall of the Alamo is the best known single event in Texas history." The heroism of the one hundred and eighty-odd men who defended that fortress until death, against an overwhelming force, is the glory of Anglo-America, and indeed of the world. The men of the Alamo left to posterity a new standard of devotion to country and fidelity to a trust. The very completeness of the tragedy of March 6, 1836, has inspired one of the most striking epigrams ever uttered: "Thermopylae had her messenger of defeat; the Alamo had none."

The Alamo today is the property of the State of Texas and stands in the heart of the downtown business district of San Antonio as a mecca for thousands of Texan, American and foreign visitors each month. The Daughters of the Republic, a patriotic organization of Texas women, have charge of caring for this wonderful landmark of Texas history. Through their work and influence, led by Mrs. Clara Driscoll Sevier, the property was purchased by the State of Texas and dedicated as "The Shrine of Texas Liberty" to be preserved permanently for future generations. As a result of their continued efforts and the financial assistance of Mrs. Sevier, the State of Texas has purchased the surrounding property and work is now progressing to a conclusion on the construction of a beautiful park to surround this shrine.

At the time of the 1934 meeting of the Southern Medical Association in San Antonio, every visitor should visit the Alamo and ascertain at first hand the data to show the remarkable heroism of the small band of Texas patriots who defended it until death in the cause of Texas independence. The brief outline of the history of the Alamo given hereinafter can do but scant justice to this subject, but it is given in the hope that each reader will later visit this revered landmark in person.

The year 1718 was marked by the official establishment under Spanish auspices of the Alamo, known as the Mission San Antonio de Valero. This was followed in the succeeding fifteen years by the establishment of four additional missions by the Franciscan Fathers within a short distance of the Alamo and now preserved just outside the city limits of San Antonio. These missions were primarily established for the conversion of the Indians to Christianity and for use as churches by the Spanish inhabitants, but were also constructed to serve for defense from hostile Indians.

Moses Austin made the first definite and recognized attempt to establish an American colony in Texas early in the Nineteenth Century. Following the death of the elder Austin, his son, Stephen F. Austin, carried on the work with limited success. Among the Americans coming during those pioneering days, whose names have been linked with San Antonio, and whose bravery had much to do with the historic prominence given this city, were Sam Houston, Ben Milam, James and Resin Bowie, Edward Burleson, Davy Crockett, "Deaf" Smith and such military leaders as William B. Travis and J. W. Fannin.

The Mexican government, following the overthrow of Spanish control of that country between 1812 and 1821, offered liberal terms to the colonists for the purpose of developing the territory of Texas. This caused an additional influx into Texas of hardy, pioneering Americans. Differences of opinion on the government of Texas soon arose between the Mexicans and the American colonists. In 1834 several meetings were held in San Antonio by the Americans to discuss Texas independence from Mexico. These activities alarmed the Mexicans and actual warfare was inaugurated by an attempt to disarm the Americans at Gonzales, seventy miles east of San Antonio.

Ben Milam led a successful attack on the Mexican forces in control of San Antonio and forced their surrender on December 15, 1835. The Americans thought that the war was now over and most of them obtained their discharge from this volunteer force and returned to their homes for Christmas rejoicing, leaving San Antonio in the keeping of about 100 men. By January 6, 1836, Col. J. C. Neill, in command of this small garrison, heard that a large Mexican force under General Santa Ana was advancing toward San Antonio and

*Prepared by Mr. Howell W. Jones, Secretary, Convention Department, San Antonio Chamber of Commerce, for Dr. P. I. Nixon, Chairman of Publicity for the Southern Medical Association's San Antonio meeting.

appealed to General Houston and Governor Smith for reinforcements. In answer to this appeal, Houston sent Bowie with 30 men from Gonzales with orders to destroy the fortifications, blow up the Alamo, and evacuate the town. But once within San Antonio, Bowie became impressed with the necessity of holding this strategic point and failed to carry out these orders. He sent back this word to General Houston: "Col. Neill and myself have come to the same conclusion, that we had rather die in these ditches than give it up to the enemy. * * * Bexar is the key to the situation. * * * Public safety demands our lives rather than evacuation of it into the hands of the enemy."

Governor Smith, on his part, sent Travis with about 30 men to reinforce Neill. Travis reached San Antonio on February 2 or 3, and when Col. Neill was called

The Alamo.

away "in consequence of the sickness of his family," Travis succeeded him in command. Bonham had arrived about January 19 and David Crockett with his "Twelve Tennesseans" early in February, so that on February 12 Travis wrote:

"We have not more than 150 men here, * * * yet we are determined to sustain it as long as there is a man left because we consider death preferable to disgrace, which would be the result of giving up a post which has been so dearly won, and thus opening the door for the invaders to enter the sacred territory of the colonies. * * * Should we receive no reinforcements, I am determined to defend it to the last, and should Bexar fall, your friend will be buried beneath its ruins."

In the same spirit twelve days later, facing certain death, he wrote in his famous last letter: "I shall never surrender or retreat."

As late as March 1, the already doomed band in the Alamo was joined by thirty men from Goliad, under Capt. Albert Martin, who knew that they were deliberately walking into a death trap, but would not fail in giving what aid they could to their besieged friends, although they had to dodge the thousands of Mexican troops attacking the fortress in order to join Travis and his men.

The siege of the Alamo by General Santa Ana and at least four thousand troops began about February 23 and the last of the defenders died on March 6, 1836. All histories agree that the Americans fought off the besieging Mexicans for twelve days "from the walls of the Alamo."

During this siege, the Americans under General Houston had concentrated and were advancing toward San Antonio to meet the Mexican troops. It is unnecessary here to describe the several skirmishes between the Texans and the Mexicans and the strategic retreat of General Houston and his forces until they reached the banks of the San Jacinto River near the present site of Houston. At this point, with only this small body of water separating the two forces, on April 21, 1836, General Houston made a surprise attack on the Mexican troops while they were enjoying an afternoon siesta and completely routed them. The Americans entered the battle with the shouts of "Remember the Alamo," "Remember Goliad" and pursued the troops of General Santa Ana in all directions and ended by capturing Santa Ana and bringing him to General Sam Houston.

The Battle of San Jacinto ended the war of independence from Mexico and the flag of the Republic of Texas flew over the Alamo until the annexation of Texas, at its request, by the United States in 1845.

San Antonio cordially invites all members of the Southern Medical Association to attend the 1934 meeting in this city and to visit the "Shrine of Texas Liberty" where 182 Texans defended until death the Alamo from the attack of at least 4,000 Mexicans and established its place in the great epics which mark the history of the struggle for freedom throughout the world.

After San Antonio, Mexico

MEXICO CITY*

Topping the list of the numerous attractions that distinguish the Republic of Mexico is, of course, Mexico City, capital and largest city and center of the social, political and cultural life of the nation. Its population, which is in excess of one million, is as cosmopolitan as that of any of the famed capitals of the world. Its official circles are impressive at work and brilliant at play, and a colorful contrast exists between its lei-

*Prepared for the SOUTHERN MEDICAL JOURNAL by the Publicity Department of the Missouri Pacific Lines.

sured society and its workaday citizens. Paris, Vienna, Shanghai, Tokyo, Teheran, capitals and interesting cities of the world that lure the visitor with stories of their modern gayety, their individual charms and historical backgrounds, have less to offer the American who is interested in the birth and development of civilization in his own particular corner of the globe than this ancient city of the Aztecs.

In its popular conception, the Republic of Mexico is often erroneously believed to be a vast expanse of chaparrel waste, with its capital an elusive mirage. In actuality, nothing could be farther from the truth. There are deserts, but they share Mexico with snow-capped mountain peaks, lush green valleys, cool coast-lands and deep tropical forests. Mexico City itself is built in a cool valley whose elevation is approximately 7,800 feet above sea level, and whose maximum summer temperature is 79 degrees. The climate is dry and healthful, the days brilliant with a warm sun, the nights too cool to be abroad without a wrap. Clothes that are suitable in the northern United States during the early fall are correct for wear in Mexico City the year round.

Mexico City is a vast treasure-house of interest for the visitor from a country whose age is still in the adolescent period when compared with the older nations of the world. A knowledge of its history makes its interest much greater, but there is room here for no more than a brief sketch. The city was founded in 1325 by wandering Indians whose tribal legends instructed them to build their permanent abode on the spot where they would witness an eagle engaged in mortal combat with a serpent. The first crude dwellings that rose on their pilings above the surface of Lake Texcoco gave no hint of the magnificent city that was to be the home of the Aztec Emperors. This mighty city, the most beautiful, the wealthiest and the most cultured in the Western Hemisphere, flourished for centuries before the white races on the European Continent even knew of its existence. Cortez, in his effort, after the Conquest, to restore the magnificence of the city, laid the foundation of the modern city that is the present capital of the Republic of Mexico.

There is much of interest to see in Mexico City, starting with the interesting railroad station into which the National Railways of Mexico pulls the Missouri Pacific Lines equipment from St. Louis and Memphis via San Antonio. From the station to any one of the fine hotels is an interesting ride along the city's tree-lined streets. The Paseo de la Reforma, the street that leads to the entrance to Chapultepec, is one of the most beautiful streets in the world. Wide driveways skirt either side of a heavily wooded and artistically landscaped parkway, and at studied intervals, widen into stately glorietas with fountains or statues. Chapultepec Park, at the end of this kingly residential street, is really the grounds of Mexico's White House, Chapultepec Castle. On Sundays there are band concerts here and fashionable promenades. There are lichened trees in the Park whose drooping branches gave grateful shade to Montezuma, last of the Aztec Emperors, and to Cortez, and that now line the Park driveways and bridle paths. High above them towers the white, gleaming mass of the Castle where Maximilian held brief sway and where Madero dreamed his dreams of freedom for Mexico. On Sunday afternoons there is another place in Mexico City that draws the crowds with an irresistible appeal, the Bull Ring. Here the Mexican witnesses his favorite sport, a sport in whose engagement the participants are trained from early youth, a sport in which the gravest rules of courtesy and the strictest principles of dignity are observed, although the sole antagonist is completely oblivious of their existence.

There are many other places in Mexico City to interest the visitor. The great Cathedral, said to be the largest on the American Continent, is in the heart of the city and houses one of the richest collections of religious articles in the world. Its altar rail is of pure silver, its magnificent altars so intricately carved and decorated that the imagination reels in contemplating the hours of labor that must have gone into their workmanship. The National Palace, covering a large city block, houses many of the governmental departments and dates back to 1692, when it was built by royal order of the King of Spain. The National Museum, with its fine examples of Aztec art, the Palace of Fine Arts, the House of Tiles—one could go on indefinitely listing the places of beauty, of historical interest and of modern appeal to be seen in Mexico City.

Chapultepec Castle, the "White House" of Mexico.

Modern Mexico City also offers many opportunities for amusement and entertainment. Night clubs and hotel dining rooms provide supper dancing to the accompaniment of fine orchestras, with floor shows that rival those of our own larger cities. Theaters, moving picture shows, jai-jalai games, golf courses, tennis courts and many other facilities for sport and pleasure lend their aid to the full enjoyment of the visitor's day and evening.

Book Reviews

Benign and Cancerous Gastric Disturbances. By J. Shelton Horsley, M.D., Richmond, Virginia. Porter Lectures, Series III, delivered at the University of Kansas School of Medicine, Lawrence, Kansas. Fifty-six pages. University Extension Division, University of Kansas, 1934.

This small volume, which may be read in an hour, contains three lectures, dealing with indigestion, with the cancer problem in general, and with cancer of the stomach. Gastric digestion is reviewed with a discussion of the cerebral control of digestion. Inheritance of cancer, irritating substances which are capable of inducing experimental cancer, diagnosis and surgery of gastric cancer are included. The bibliographies are brief, and judicious selection has been made of material from the tremendous literature. The style is simple and graphic, and the attention of the reader is held throughout.

Benign Tumors in the Third Ventricle of the Brain: Diagnosis and Treatment. By Walter E. Dandy, M.D., Adjunct Professor of Surgery, the Johns Hopkins University. 171 pages, illustrated. Springfield, Illinois: Charles C. Thomas, 1933. Cloth, $5.00.

These are brain tumors which, if correctly diagnosed, are removable, with relief of symptoms. The advent of ventriculography, says Dandy, has made their diagnosis and localization one of great certainty. His book, which is beautifully and profusely illustrated, contains twenty-one cases from the author's experience, with a review of others from the literature. The descriptions of the method of diagnosis and the technic of operation are explicit. Internists, neurologists and neurosurgeons will find this a most valuable text.

Diseases of the Skin. By Oliver S. Ormsby, M.D., Clinical Professor and Chairman of the Department of Dermatology, Rush Medical College of the University of Chicago. With Revision of the Histopathology in this Edition by Clark Wylie Finnerud, B.S., M.D., Assistant Clinical Professor of Dermatology, Rush Medical College of the University of Chicago. Fourth Edition, Thoroughly Revised. 1,288 pages, illustrated. Philadelphia: Lea & Febiger, 1934. Cloth, $11.50.

Any novel or biography by a popular author enjoys more treatment at the hands of the reviewer than any half dozen medical books together receive from their respective critics.

A quick line or two of praise or blame; commendation or condemnation. With these and the description of a peep or two within the covers of his work the medical author and his publisher and the prospective buyer must be content.

A standard book like Ormsby's "Diseases of the Skin" is particularly likely to receive brief attention. For the initiated it is as prosaic a necessity as breakfast. At least two generations of physicians have placed it on their shelves. The names of the authors have been changed as the masters who were responsible for it passed on. But, keeping its character and peculiar flavor, this treatise, enlarged, revised, maintained up to date with each edition, has remained the same.

Numerous new disease entities are described: many recent additions to dermatological knowledge find place in this fourth edition. References to and descriptions of treatment for various dematoses are numerous. Too numerous, perhaps, for the general practitioner, who might prefer sometimes that the author give more space to his own favorite remedies and methods. However, the serious student will find what he seeks along this line under the chapter on general therapeutic measures.

The student will find that this new edition contains a remarkably complete bibliography. No other single volume on dermatology with which this reviewer is acquainted is so richly equipped in this respect.

The hand of the author's brilliant associate, Clark Finnerud, is visible in many places in the book. The section on histopathology, for which he is responsible, is unexcelled in any one volume on diseases of the skin.

Allergy in General Practice. By Samuel M. Feinberg, M.D., F.A.C.P., Assistant Professor of Medicine and Attending Physician in Asthma and Hay Fever Clinic, Northwestern University Medical School; Professor of Medicine in the Cook County Graduate School of Medicine. 339 pages, illustrated. Philadelphia, Pennsylvania: Lea & Febiger, 1934. Cloth, $4.50.

This book brings out the fact that, on account of its many-sided nature, allergy touches all branches of medicine. It is written expressly for the general practitioner, but will be found of much value to the diagnostician, rhinologist, laryngologist, gastro-enterologist and other specialists.

It contains a good list of allergens ordinarily encountered and methods of treatment. It is a very commendable work.

New and Nonofficial Remedies, 1934. Containing Description of the Articles which Stand Accepted by the Council on Pharmacy and Chemistry of the American Medical Association on January 1, 1934. 510 pages. Chicago: American Medical Association, 1934. Cloth, $1.50.

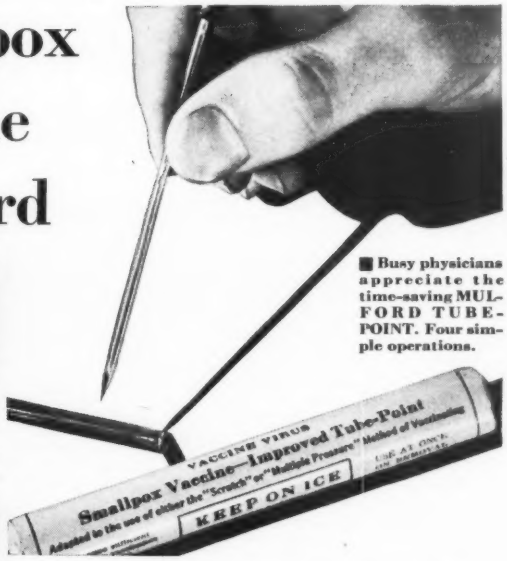
More necessary than a dictionary is this volume which lists the new drugs and segregates the potent and effective from the many which are constantly presented to the physician under false claims.

Annual Reprint of the Reports of the Council on Pharmacy and Chemistry of the American Medical Association for 1933. With the comments that have appeared in the Journal. 188 pages. Chicago: American Medical Association, 1933. Cloth, $1.00.

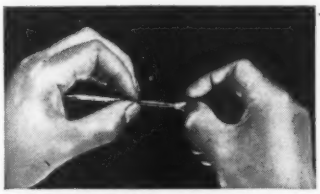
The reports on various urinary antiseptics are of particular interest. There is a chapter on the estrogenic substances which, in view of the extensive recent clinical trials of these drugs, should be read carefully. This small volume is possibly the most essential single medical book of the year. From the standpoint of the reviewer and the physician it is unfortunate that the reports are published in very small type.

BOOK REVIEWS continued on page 18

The easier Way to Vaccinate with Smallpox Vaccine Mulford



■ Busy physicians appreciate the time-saving MULFORD TUBE-POINT. Four simple operations.



Place rubber bulb on small end of tube-point and break the tip inside the bulb.

Break the tube-point at the file mark without contamination of the tip.

Expel the virus from the tube directly on the previously cleansed area of the skin.

Transfer tube-point to right hand. Holding point parallel to the skin surface, apply pressure through the virus, with an up-and-down motion, repeated 20 to 30 times.

THE Mulford Improved Capillary Tube-Point brings speed and greater safety to smallpox vaccination. It is a sterile, sealed vaccine container and inoculating instrument all in one.

This unique time-saving container is ready for immediate use with any of the approved technics—multiple pressure, puncture, or scratch.

Smallpox Vaccine Mulford delivers a high percentage of "takes" . . . it is uniform . . . it carries assurance of potency and purity, because exhaustive tests are carried out on each lot before release.

Smallpox Vaccine Mulford is backed by 35 years' continuous experience and research. It is a vaccine you can rely on.

Smallpox Vaccine Mulford is available in the following packages: Capillary Improved Tube-Points—Single's and Ten's. Capillary Tubes—Ten's.

MULFORD BIOLOGICAL LABORATORIES

Sharp & Dohme

PHILADELPHIA BALTIMORE MONTREAL

Continued from page 746

The Elements of Experimental Embryology. By Julian S. Huxley, M.S., Honorary Lecturer in Experimental Zoology, King's College, London, and G. R. DeBeer, M.A., D.Sc., Fellow of Merton College and Jenkinson Lecturer in Embryology, Oxford. 514 pages, illustrated. New York: The Macmillan Company, 1934. Cloth, $7.00.

The authors have restricted this text to the developmental period prior to the histological differentiation of the tissue. The approach has been made from the biological aspect. With extensive bibliography and many references they build up the facts that: animal development is epigenetic and is predetermined; that this predetermination is progressive, there being gradiant fields which are brought about by agencies external to the egg (e. g., sperm entry, chemicals, heat and cold). The organizer or dominant region may influence the mosaic stage into development up to a certain point, but other factors as neighboring tissues may influence the final outcome. As the tissues continue to develop fewer changes can occur until finally each section has received its final pattern for life. They point out there are certain physiological fundamentals in regard to the field system and the physiochemical processes which must be further worked out. This book is limited in its appeal to the anatomist and experimental embryologist.

Corrective Physical Education. By Josephine Langworthy Rathbone, M.S., Instructor in Physical Education, Teachers' College, Columbia University. 292 pages, illustrated. Philadelphia: W. B. Saunders Company, 1934. Cloth, $2.50.

The basis of corrective physical education is outlined and the student is treated to a review of human anatomy and physiology as related to exercise. The various types of faulty and underdevelopment are explained and appropriate exercises are described, illustrated by means of "stick-men" drawings. It is an excellent book for those interested in this type of work.

Southern Medical News

ALABAMA

Dr. James Somerville McLester, Birmingham, was recently honored with a banquet given him by the Jefferson County Medical Society in recognition of his election as President-Elect of the American Medical Association. About 250 physicians, members of the Society and guests, attended. Speakers on this occasion included Dr. George S. Graham, Birmingham, President of the Jefferson County Medical Society; Dr. Cabot Lull, Birmingham; Dr. W. M. Cunningham, Jasper, President of the Medical Association of the State of Alabama; Dr. J. E. Paullin, Atlanta; Dr. George H. Denny, University, President of the University of Alabama; and Dr. C. B. Glenn, Birmingham, Superintendent of Schools of Birmingham.

Continued on page 20

SECURITY and NORMALCY

DRYBAK STRAPPINGS DISCOMMODE THE PATIENT LESS

• Patients benefit from the strength and support of Drybak strappings without the bother of keeping them thoroughly dry. Even when submerged, the glazed, waterproof backcloth of Drybak prevents the plaster from becoming loose or soggy. The edges stay smooth and snug.

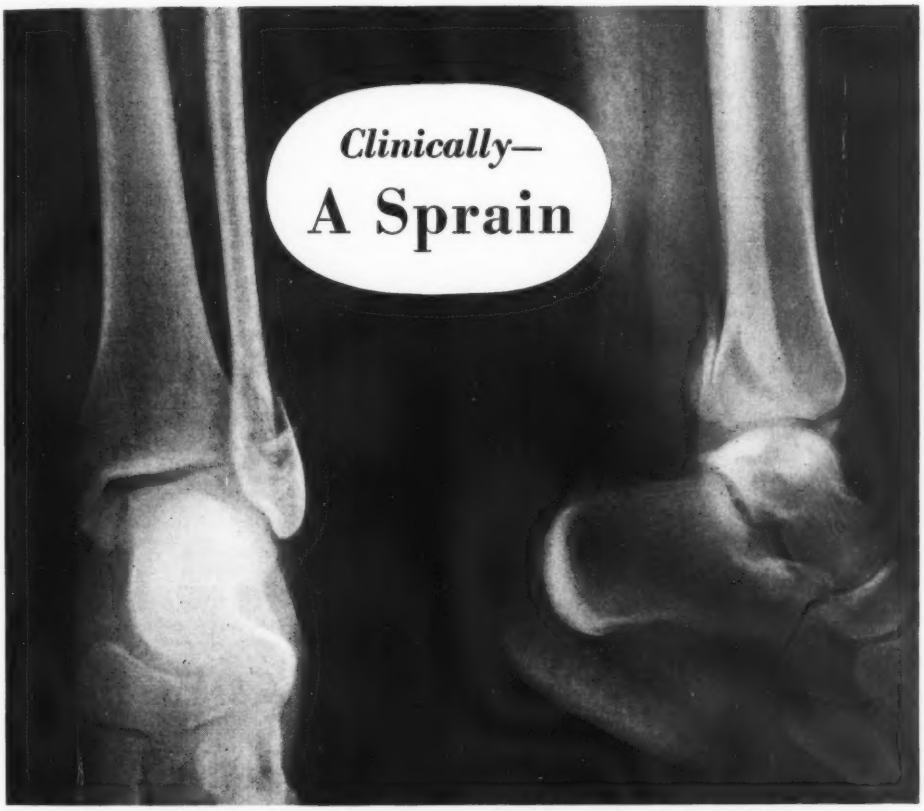
• Drybak's sun-tan color is less conspicuous, and eliminates the usual "accident" appearance. Made in standard widths and lengths in cartridge spools, hospital spools, and in rolls 5 yds. x 12", uncut. Order from your dealer.

COSTS NO MORE THAN REGULAR ADHESIVE PLASTER

DRYBAK
THE WATERPROOF ADHESIVE PLASTER

Johnson & Johnson
NEW BRUNSWICK, N. J. CHICAGO, ILL.

PROFESSIONAL SERVICE DEPARTMENT



Radiographs of ankle showing fractures which clinically might have been interpreted as a severe sprain.

. . . BUT radiographically—fracture. Don't risk missing any fractures. Regard every apparent sprain or severe bruise with suspicion; refer your patient to the radiologist. Frequently when there seems to be only a sprain or bruise, or even an obvious fracture, serious injury that is more obscure may be overlooked.

To Show True Condition

Radiographs made *in several planes* and stereoradiographs will show the true condition. When a fracture is present, there should be an x-ray examination before and after reduction—first, to determine the nature of the injury; second, to show the apposition of fragments after reduction; and third, to determine the presence of callus formation after a reasonable interval.

The use of x-rays in cases of fracture is most important, for medicolegal situations place heavy responsibility upon the physician when this examination is omitted. Safeguard your patients as well as your practice by using x-rays to the fullest extent.

NRA CODE

"Radiography and Clinical Photography" will be sent regularly if you will mail the coupon below.

Radiographs Provide Diagnostic Facts

EASTMAN KODAK COMPANY, *Medical Division,*
347 State Street, Rochester, N. Y.

Gentlemen: Please send me "Radiography and Clinical Photography," without charge.

Name _____

No. & St. _____

City & State _____

Continued from page 18

Dr. C. A. Thigpen, Montgomery, has had the degree of Doctor of Laws conferred on him by the University of Alabama.

DEATHS

Dr. Frank Emens, Trinity, aged 64, died April 26 of pneumonia.

Dr. Aaron Godwin, Muscadine, aged 47, died January 17 of heart disease.

Dr. Gilmer H. Moore, Opelika, aged 54, died April 13 of peptic ulcer.

Dr. Austin Flint Townsend, Daleville, aged 63, died April 7 of cerebral hemorrhage.

Dr. Henry George William Reinhardt, Muscle Shoals, aged 65, died May 9.

ARKANSAS

Dr. L. J. Kosminsky, Texarkana, was elected President of the Missouri Pacific Surgeons' Association at a recent meeting of the Association.

The Monroe County Medical Society conducted a tuberculosis case-finding clinic at Brinkley in April, with Dr. J. J. Willingham, State Sanatorium, and Dr. S. C. Fulmer, Little Rock, assisting.

The Lincoln County Medical Society held its thirty-eighth anniversary meeting in May. Dr. B. F. Tarver, Star City, and Dr. A. S. J. Collins, Monticello, the only two living charter members, were honored by the Society at that time.

Members of the Sebastian County Medical Society recently met in a dinner session as guests of the Muskogee, Oklahoma, County Medical Society.

Dr. J. A. King, Elaine, has opened a six-room hospital with a bed capacity of eighteen.

DEATHS

Dr. Oleander Howton, Luxora, aged 56, died May 7 in a Memphis, Tennessee, hospital of pneumonia.

Dr. C. B. Patton, Batesville, aged 90, died May 3.

Dr. Albert I. Moore, Fayetteville, aged 72, died May 8.

DISTRICT OF COLUMBIA

State and Provincial Health Authorities of the United States, Canada, Hawaii and the Philippines met in Washington recently for a conference.

Dr. Margaret Mary Nicholson, Washington, was elected Editor-in-Chief of Alpah Epsilon Iota, national fraternity for medical women, at the biennial convention of the fraternity at the Richmond Academy of Medicine in June.

The Medical Society of Virginia, Maryland and the District of Columbia has elected the following officers for the ensuing year: Dr. R. Arthur Hooe, Washington, President; Dr. William P. Herbst, Vice-President; Dr. Harry F. Davies, Washington, Secretary; Dr. A. Magruder MacDonald, Washington, Corresponding Secretary; and Dr. Robert Scott Lamb, Washington, Treasurer.

FLORIDA

Newly elected officers for the coming year of the Florida State Medical Association are: Dr. Herbert L. Bryans, Pensacola, President-Elect; and Dr. Shaler A. Richardson, Jacksonville, re-elected Secretary. Dr. Stewart G. Thompson, Jacksonville, was appointed Business Manager. Dr. Homer L. Pearson, Jr., Miami, is the incoming President.

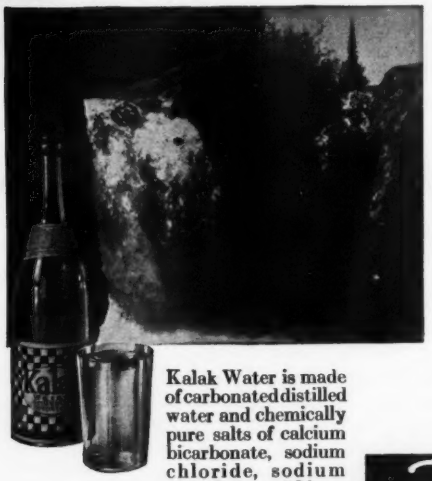
Dr. Leland F. Carlton, Tampa, is the newly elected President-Elect of the Florida Railway Surgeons' Association. Dr. Walter C. Page, Cocoa, is the incoming President of the Association. Life membership was conferred upon Dr. Edmund W. Warren, Palatka, for many years Secretary-Treasurer.

Dr. Andrew P. Albaugh, Tarpon Springs, Dr. John D. Peabody, St. Petersburg, and Dr. Charles L. Jennings, Jacksonville, had life memberships conferred upon them by the Florida State

Continued on page 22

A Pure, Palatable, Carbonated

PREPARED WATER



THERE are many conditions, no doubt, where you will want your patient to increase his daily intake of water.

In such cases, why not suggest the use of Kalak Water, the palatable, carbonated alkaline water prescribed by physicians for over twenty years.

Kalak Water is made of carbonated distilled water and chemically pure salts of calcium bicarbonate, sodium chloride, sodium phosphate and bicarbonates of magnesium, potassium and sodium.

Kalak

THIS YOUNG MOTHER IS ABOUT TO MAKE A MISTAKE

MOTHER:
And please send me half a dozen tall cans of evaporated milk.
GROCER:
Certainly. What brand?
MOTHER:
Oh, no particular kind, I guess. Any brand will do.

THIS mother went to her doctor to get an infant feeding formula. The doctor wrote the formula—using evaporated milk as the chief ingredient—and sent the mother on her way with a friendly warning—"Follow these instructions to the letter!"

But . . . those instructions were just *seven letters* short!

Seven letters, B-O-R-D-E-N-S.

To the physician, the name Borden has so long been synonymous with pure, high quality evaporated milk that he is likely to take it for granted that all mothers would choose as he would. How much better it is to make this wise choice a certainty! One word—Borden's—in the infant feeding formulas you write will make sure that your little patients get an evaporated milk that measures up to your highest professional standards.

ACCEPTED AMERICAN MEDICAL ASSN. Committee on Foods

BORDEN'S EVAPORATED MILK was the first evaporated milk for infant feeding to be submitted to the American Medical Association Committee on Foods, and the first to receive the seal of acceptance. No formulas are given to the laity . . . Free to physicians—full-sized cans of Borden's Evaporated Milk. Just write to The Borden Company, Dept. SN 84, 350 Madison Ave., New York, N. Y.

Borden's NRA

EVAPORATED MILK

Continued from page 20

Medical Association at the recent annual meeting of the Association at Jacksonville.

The Orange County Medical Society held a stag picnic and barbecue in June, to which were invited all members of the Florida Medical Association.

Dr. E. J. Melville, St. Petersburg, accompanied by Mrs. Melville, has left for a trip around the world, during which time he will spend some time in Vienna working with Professor Gessman.

Dr. James L. Estes, Tampa, has been attending the Brady Urologic Clinic in Baltimore.

Dr. Gordon Ira, Jacksonville, has been named Junior Chamber of Commerce golf champion.

Dr. A. Daniel Amerise, Coral Gables, recently did work at the Postgraduate Medical School of Harvard University.

Dr. Henry Hanson, Jacksonville, State Health Officer, was present at the Conference of State and Provincial Health Authorities of the United States, Canada, Hawaii and the Philippines held in Washington, District of Columbia, recently.

Dr. S. C. Harvard, Vice-President of the Pasco-Hernando-Citrus County Medical Society, recently entertained the Society at the Woodland Golf and Country Club. The scientific meeting was preceded by a chicken dinner.

Dr. R. E. Repass, Miami Beach, has been taking postgraduate work at Gill Memorial Hospital, Roanoke, Virginia.

DEATHS

Dr. Will W. Tyson, Perry, aged 68, died April 1 of pneumonia.

GEORGIA

Dr. Dunbar Roy, Atlanta, was elected President of the American Laryngological Society at its recent meeting in Cleveland, Ohio. Dr. Roy is the first physician in the South practicing rhino-laryngology ever to be elected to the presidency of this Associztion.

Dr. T. F. Abercrombie, Atlanta, has been elected President of the American Public Health Association.

The Lamartine Griffin Hardman Cup, presented to the Georgia Medical Association by Dr. Hardman when he was Governor of the State, has been awarded to Dr. James A. Redfearn, Albany, for his outstanding work in bringing about the malaria control program in Dougherty County. Dr. Redfearn is the second physician to have his name inscribed on this cup, which is kept on display at the Capitol in Atlanta, and which marks a contribution to the field of public health or discovery in medicine.

Dr. Charles L. Ridley, Macon, is the newly appointed Superintendent of the Macon Hospital.

Dr. T. C. Davison, Atlanta, was recently appointed a member of the Staff of the Reserve Officers' Association of Georgia, and was elected surgeon of the Georgia Department of the Association.

Dr. Edgar Boling, Atlanta, has moved into new offices in the Doctors Building.

Dr. Kenneth Hunt, Griffin, and Dr. George Walker, formerly of Atlanta, announce their association in the practice of medicine at Griffin.

Dr. and Mrs. L. G. Neal, Cleveland, were hosts at dinner recently to members of the Hall County Medical Society.

Dr. P. C. Quarterman and Dr. E. F. Thompson, Valdosta, were hosts to members of the Lowndes County Medical Society at a dinner recently.

Dr. O. H. Cheek, Dublin, Laurens County Commissioner of Health, with the assistance of field nurses and laboratory technician, recently conducted a hookworm survey of all white public schools in the County.

DEATHS

Dr. Jesse C. Bennett, Jefferson, aged 65, died suddenly April 19 of diabetes mellitus.

Dr. H. L. Cook, Quitman, aged 66, died January 18 of chronic myocarditis.

Dr. Charles McPherson Curtis, College Park, aged 68, died May 6 of heart disease following an operation for appendicitis.

Dr. Farris Lucius Jackson, Athens, aged 39, died suddenly March 27 of heart disease.

Dr. V. J. Brown, Buckhead, aged 56, died May 30.

Continued on page 24

Phyllicin

the new theophylline salt

Phyllicin is a potent diuretic and cardiac stimulant in doses of 1 tablet two to four times a day, after meals. Prescribe Phyllicin to relieve cardiac distress and reduce edema of cardiac or nephritic origin ...

In 4 grain Tablets and as a Powder

Literature and samples upon request

Bilhuber•Knoll Corp.,

154 OGDEN AVE., JERSEY CITY, N. J.

SMACO

CAROTENE IN OIL

(FORMERLY CALLED CARITOL)

Smaco Carotene in Oil is a solution of carotene which is the plant source of all vitamin A activity and is commonly referred to as the precursor of vitamin A or Pro-Vitamin A. Unlike other therapeutic forms of vitamin A activity, Smaco Carotene in Oil is derived entirely from vegetable sources and therefore has NO FISHY TASTE. Offered in capsules and in dropper-top bottles.

Smaco Carotene is also available with Vitamin D Concentrate in oil (Zucker Process), and in Cod Liver Oil.

ACCEPTED AMERICAN MEDICAL ASSN.

S.M.A. CORPORATION • CLEVELAND, OHIO

Continued from page 22

KENTUCKY

Dr. William R. Thompson, Lexington, formerly Assistant Superintendent of the Eastern State Hospital at Lexington, has been appointed psychiatrist at the Central State Hospital at Lakeland.

Dr. John D. Jackson, Danville, it is reported, has been named to succeed Dr. Oscar L. May as Physician to the Kentucky School for the Deaf.

Dr. John Ewing Dunn, Smithland, and Miss Louise Rouse were married April 20.

Deaths

Dr. James Aibert Davis, Covington, aged 67, died March 23 of cerebral hemorrhage.

Dr. Jacob Aaron Flexner, Louisville, aged 76, died April 13 of angina pectoris.

Dr. Edwin A. Stevens, Mayfield, aged 70, died May 4 of cerebral hemorrhage.

Dr. O. P. Nuckols, Pineville, aged 72, died suddenly in April.

Dr. William W. Smith, Louisville, aged 66, died May 2 of a fracture of the hip sustained in a fall.

Dr. Millard F. Biggers, Glasgow, aged 69, died May 6 of cerebral hemorrhage.

Dr. William Johnson, London, aged 65, died April 23 of heart disease.

Dr. Percy Vernon Ellis, Ghent, aged 69, died May 1 of cerebral hemorrhage.

Dr. Richard Henry Crisler, Burlington, aged 86, died May 6 in Cincinnati of myocarditis.

Dr. Robert Thomas Bailey, Central City, aged 54, died April 17.

LOUISIANA

Dr. Amedee Granger, New Orleans, Professor of Radiology, Louisiana State University Medical Center, recently had conferred upon him the Cross of a Chevalier of the French Legion of Honor.

The Lafourche Valley Medical Society held its quarterly meeting in Thibodaux in April and elected the following officers for the coming year: Dr. W. J. Duval, Houma, President; Dr. Leo J. Kerne, Thibodaux, Vice-President; and Dr. Guy R. Jones, Lockport, Secretary and Treasurer.

Dr. Reason Louis Cope, Marksville, and Miss Hazel Marquez were married in April.

Deaths

Dr. Carroll W. Allen, New Orleans, aged 59, died April 14 of heart disease and diabetes mellitus.

Dr. Edward G. Lawton, Natchitoches, aged 68, died March 11 of mitral regurgitation.

Dr. Thomas Maxwell Toler, Washington, aged 61, died in April of heart disease.

A SAFE FOOD
for Summer Use

Horlick's —The— Original **Malted Milk**

Answers Many Problems of Hot Weather Diet:

1. A dependable, easily digested food for infant or growing child.
2. A nourishing food-drink for the nursing mother.
3. A beneficial table beverage in place of tea or coffee.
4. A delicate food for the sick or convalescent.
5. A light luncheon, at any time, for the doctor and his family.

HORLICK'S MALTED MILK CORP.
RACINE, WIS.

MARYLAND

The Charles E. Dohme Memorial Lectures at Johns Hopkins University School of Medicine were delivered this year by Donald D. Van Slyke, Ph.D., of the Rockefeller Institute for Medical Research, New York.

Johns Hopkins University was the beneficiary through the will of the late Dr. William H. Welch in the provision of an endowment fund, this fund to be used for any purposes approved by the Trustees, with preference given to the needs of the Institute of History of Medicine and the Welch Medical Library.

Dr. H. E. Sigerist, Professor of Medical History, Johns Hopkins University School of Medicine, and Dr. Robert W. Johnson, Jr., Assistant Professor of Orthopedic Surgery at Johns Hopkins University School of Medicine, recently lectured at Duke Hospital, Durham, North Carolina, on their respective subjects.

The Central Atlantic States Association of Dairy, Food and Drug Officials met in Baltimore in June for its eighteenth annual session. Dr. Elmer V. McCollum, Baltimore, Professor of Biochemistry of the Johns Hopkins School of Hygiene and Public Health, was on the program to deliver an address.

Deaths

Dr. Thomas J. Wolfe, Bowie, aged 71, died in April in a Baltimore hospital.

Dr. Harry Flower Shipley, Granite, aged 60, died May 10 in a Baltimore hospital.

MISSISSIPPI

The Mississippi State Medical Association, at its recent annual meeting, elected the following officers for the coming year: Dr. James R. Hill, Corinth, President-Elect; Dr. A. B. Harvey, Tylertown, Dr. Gilruth Darrington, Yazoo City, Dr. R. C. Smith, Drew, Vice-Presidents; Dr. E. L. Wilkins, Clarksdale, Treasurer; Dr. T. M. Dye, Clarksdale, reelected Secretary; Dr. Leon S. Lippincott, Vicksburg, Historian and Editor. Dr. Edward C. Parker, Gulfport, was installed as President for the current year.

The University of Mississippi School of Medicine has received an appropriation passed by the State Legislature, which will make possible the renovation of the old medical building of the University and also the remodeling of parts of the University Hospital.

Dr. F. L. McGahey, Calhoun City, has been taking postgraduate work in New Orleans, Louisiana.

Dr. Douglas D. Baugh, Houston, has been in Memphis studying x-ray work.

Dr. H. Carrol McLeod, Hattiesburg, was recently appointed District Surgeon of the Illinois Central Railroad.

Dr. Sam B. Caruthers has located in Grenada.

Dr. J. R. Johnson has located in Jackson.

Dr. W. W. Hickman has located at Picayune to practice.

Dr. E. H. DeBerry, Hazelhurst, has been doing special work in Memphis.

The Delta Medical Society and the Clarksdale and Six Counties Medical Society have consolidated to form a new delta society. Officers elected for the coming year for the new society are: Dr. R. C. Smith, Drew, President; Dr. L. H. Brevard, Dundee, President-Elect; Dr. J. D. Simmons, Gunnison, Bolivar County, Dr. A. M. Gill, Sidon, Leflore County, Dr. J. W. Jackson, Belzoni, Humphreys County, Dr. B. H. Higdon, Sunflower, Sunflower County, Dr. D. C. Montgomery, Greenville, Washington County, Dr. I. P. Carr, Clarksdale, Coahoma County, Dr. H. G. Johnson, Tunica, Tunica County, Dr. E. A. McVey, Lambert, Quitman County, Dr. J. A. Harris, Webb, Tallahatchie County, Vice-Presidents; and Dr. F. M. Acree, Greenville, Secretary-Treasurer.

Dr. Harvey F. Garrison, Jr., Jackson, and Miss Merideth Owens were married April 25.

Deaths

Dr. John E. Golden, Walnut Grove, aged 84, died April 4 in a Jackson hospital.

Continued on page 26

Summer Diarrhea

A Rational Procedure

The following formula provides a means of supplying fuel for heat and energy and furnishes immediately available nutrition to protect body proteins, to prevent rapid loss of weight, to resist the activity of putrefactive bacteria, and to favor the retention of body fluids and salts.

Mellin's Food . . 4 level tablespoonfuls
***Water** {boiled, then cooled} 16 fluidounces*

{ *Maltose and dextrins 4.5%; wheat and barley proteins .5%; salts including added potassium bicarbonate .25%. Alkaline in reaction. pH 7.55* }

The usual practice is to give one to three ounces every hour or two until stools lessen in number and improve in character.

The mixture is then gradually strengthened by substituting one ounce of skimmed milk for one ounce of water, until the amount of skimmed milk is equal to the quantity of milk usually employed in normal conditions.

Finally the fat is gradually replaced by skimming less and less cream from the milk.

Samples and literature sent to physicians upon request.

Mellin's Food Company . . . Boston, Mass.

Directions for using Mellin's Food are left entirely to the physician.

MELLIN'S FOOD: Produced by an infusion of Wheat Flour, Wheat Bran and Malted Barley admixed with Potassium Bicarbonate—consisting essentially of Maltose, Dextrins, Proteins and Mineral Salts.

Continued from page 24

Dr. T. R. Henderson, Greenwood, aged 79, died April 28 of coronary occlusion.

MISSOURI

Dr. M. Pinson Neal, Columbia, Professor of Pathology at the University of Missouri School of Medicine, has been appointed Visiting Professor of Pathology and Bacteriology at the University of Tennessee College of Medicine and Acting Pathologist to the Memphis General Hospital, Memphis, Tennessee, for the summer quarter, taking the place of Dr. Harry C. Schmeisser during his vacation.

Dr. Bransford Lewis, St. Louis, was the recipient of a bronze plaque presented to him at the American Urological Association's recent meeting at Atlantic City in recognition of his services in editing "The History of Urology."

Dr. David P. Barr, St. Louis, will be guest lecturer at the University of Melbourn, Melbourn, Australia, this summer, delivering a series of lectures on diseases of the glands of secretion. While away Dr. Barr will also lecture before medical classes in New Zealand.

Dr. Robert B. Karn, Jr., Clayton, and Miss Helen Marie Brueggeman were married April 21.

Deaths

Dr. Joel Carlton Brown, Lewistown, aged 72, died recently of angina pectoris.

Dr. Aaron R. Elder, Harrisonville, aged 80, died April 5.

Dr. Lucius E. Ellis, Orrick, aged 56, died April 20 of malignant brain tumor and nephrectomy.

Dr. Minard J. Armstrong, Springfield, aged 53, died April 13 of angina pectoris.

Dr. George J. C. Larsen, St. Louis, aged 67, died April 16 of pneumonia.

Dr. Granville A. Richart, Blackburn, aged 73, died May 5.

Dr. Conway Bates, Ironton, aged 77, died May 2 of pneumonia.

Dr. Wilmot Charles Willits, Kansas City, aged 68, died May 1 of coronary occlusion.

Dr. Robert Terry, Gumbo, aged 69, died suddenly March 26 of heart disease.

Trademark Registered **STORM** Trademark Registered

Binder and Abdominal Supporter

Gives perfect uplift and is worn with comfort. Made of Cotton, Linen or Silk, washable as underwear.

Three distinct types of Storm Supporters — many variations of each type.

This Photo Shows Type "N"

STORM supporters are made for all conditions needing abdominal uplift. Ptosis, Hernia, Pregnancy, Obesity, Relaxed Sacro-Iliac, Articulations, Kidney Conditions, Post-Operative Support, etc.

Each Belt Made to Order **Ask for Literature**

KATHERINE L. STORM, M.D.

Originator, Owner and Maker

1701 Diamond St. **Philadelphia**

NORTH CAROLINA

The North Carolina State Medical Association, at its recent annual meeting, elected the following officers for the coming year: Dr. Paul H. Ringer, Asheville, President-Elect; and Dr. L. B. McBrayer, Southern Pines, reelected Secretary. Dr. Paul P. McCain, Sanatorium, was installed as President for the current year.

Dr. Frank H. Garriss, Lewiston, has been made County Health Officer of the newly established full-time Health Department of Bertie County, this County having discontinued its health department four years ago. The new unit, effective July 1, will be financed in part by the State Board of Health.

Dr. Yates W. Faison, Charlotte, has resumed his practice of diseases of children, with special attention to asthma, eczema, hay fever, recurrent colds, and other allergic conditions.

Dr. J. B. Helms, Morganton, is the newly elected President of the General Alumni Association of Wake Forest College.

Dr. J. P. Saunders has recently located in Asheville to practice medicine.

Dr. James Woodfin Keever and Miss Beulah Icard Streetman, both of Hickory, were married May 20.

Dr. Laurie Walker Moore, Beaufort, and Miss Anne Pryor Neale were married in June.

Deaths

Dr. Joseph L. Spruill, Jamestown, aged 63, died May 5 of carcinoma of the urinary bladder with metastasis.

Dr. Elizabeth Delia Dixon Carroll, Raleigh, aged 62, died May 16 of injuries received in an automobile accident.

Dr. Eli Crawford Boyette, Charlotte, aged 66, died May 13 of chronic pulmonary tuberculosis.

Dr. H. A. Denson, Bennett, aged 80, died June 2 of uremic poisoning.

OKLAHOMA

Dr. Anson L. Clark has located in Oklahoma City and become associated with Dr. W. J. Wallace, with offices in the Medical Arts Building. Dr. Clark was formerly of the Urological Section of the Mayo Clinic, Rochester.

Dr. O. E. Welborn, Ada, is the newly elected Health Officer.

Dr. O. W. Starr, Drumright, took postgraduate work in St. Louis recently.

Dr. H. K. Speed, Sayre, was recently elected Rotary Club Governor for the Western Oklahoma district.

Dr. L. C. Kuyrkendall, McAlester, is the newly elected District Governor of the Lions Club of Eastern Oklahoma.

Deaths

Dr. Arthur L. Nichols, Knowles, aged 66, died February 7 of rheumatism and heart disease.

Dr. Joseph P. Dyer, Jennings, aged 50, died April 24.

SOUTH CAROLINA

Dr. C. Fred Williams, Superintendent of the State Hospital, Columbia, was elected President of the American Psychiatric Association at the ninetieth annual meeting of the Association in New York City recently.

Dr. Elliott Finger, formerly of Charleston, has located at Ninety-Six, where he will practice medicine.

Dr. Perry Martin Workman, Woodruff, and Miss Anne Thompson were married in May.

Dr. James R. Des Portes and Miss Lila Parker, both of Fort Mills, were married recently.

TENNESSEE

The Middle Tennessee Medical Association met in Springfield in May and elected the following officers for the coming year: Dr. Theodore Morford, Nashville, President; Dr. J. R. Connell, Adams, Vice-President; and Dr. D. W. Smith, Nashville, Secretary-Treasurer.

Dr. James C. Gardner, Nashville, has been appointed to succeed Dr. William Albert Sullivan as physician to the Tennessee State Penitentiary. Dr. Gardner will be succeeded by Dr. Theodore Morford as physician to the Tennessee Industrial School.

Dr. J. C. Blankenship has moved from Halls to Sparta.

Dr. Milton C. Wiggins, formerly of Tucson, Arizona, has located in Paris.

Dr. William Milton Adams, formerly of New York City, where he was associated with Dr. J. Eastman Sheehan, has

Continued on page 28

"You cannot feed babies with *mathematics* you must feed them with *brains*"

—ABRAHAM JACOBI

These words, uttered some forty years ago by Jacobi, father of American pediatrics, still hold true. You *cannot* feed babies with mathematics. Only by thorough clinical tests and laboratory experimentation, plus the skillful use of the facts gathered by these check-ups, can a good baby food be determined.

For almost twenty years DRYCO has adhered to this commonsense principle. This is one of the reasons why DRYCO is the choice of so many pediatricians, physicians, and obstetricians. They know DRYCO assures *optimum nutrition*, with real living cells, not water logged tissue that *appears* to be solid.

● **DRYCO** contains less (though ample) fat content than natural milk. By the "Just" Roller Process, the remaining fat globules are so reduced and the proteins made so friable that high tolerance and rapid assimilation is certain. For this reason DRYCO is the baby food of choice when routine or concentrated feeding is desired.

● **DRYCO** contains an optimum amount of protein and minerals—especially vital in the fast-growth period.

● **DRYCO** contains a plentiful supply of the necessary Vitamins, particularly Vitamin D, which is transmitted to DRYCO by irradiation.

Feeding babies with DRYCO *is* feeding them with brains. For optimum nutrition . . . for maximum resistance to diseases of infancy . . . for solid-boned, solid-celled babies . . . try DRYCO clinically. Send for samples and clinical data. They will be forwarded promptly.

DRYCO

ACCEPTED AMERICAN MEDICAL ASSN Committee on Foods

Made from superior quality milk from which part of the butterfat has been removed, irradiated by the ultra-violet ray, under license by the Wisconsin Alumni Research Foundation (U. S. Pat. No. 1,680,818) and then dried by the "Just" Roller Process.

THE DRY MILK COMPANY, INC.

DEPT. SM, 350 MADISON AVENUE, NEW YORK, N.Y.

Continued from page 26

moved to Memphis and announces the opening of offices in the Physicians and Surgeons Building, with practice limited to plastic and reparative surgery.

Dr. Henry Kelso Cunningham, Knoxville, and Miss Marie Russell Mininger were married June 9.

Deaths

Dr. William R. C. Booher, Bristol, aged 67, died April 4.

Dr. Robert Alonzo Burke, Dyersburg, aged 67, died suddenly May 6 of heart disease.

Dr. William Harris Daniel, McEwen, aged 65, died April 15 of nephritis.

Dr. David A. Nunn, Halls, aged 83, died April 1 of hypostatic pneumonia.

Dr. Joe Asa Fowlkes, Dyersburg, aged 77, died April 5.

Dr. William Alfred Dulaney, Blountsville, aged 84, died April 9.

Dr. George T. Newbill, Atwood, aged 85, died in March.

Dr. William Perry Stone, Palmer, aged 66, died suddenly April 15 of heart disease.

Dr. James M. Hammer, Fountain City, aged 79, died April 20.

Dr. LaFayette Seal, New Tazewell, aged 70, died suddenly May 11 of heart disease.

Dr. William Prentice Knox, Alcoa, aged 29, died May 6 of acute uremia.

Dr. John Willis Baldwin, Arthur, aged 77, died May 10 of disease of the prostate gland.

Dr. Charles W. Miles, Sr., Union City, aged 85, died May 9 of pneumonia.

Dr. John Robert Moon, Eagleville, aged 80, died April 11.

Dr. Noah Danley, St. Joseph, aged 76, died May 6.

Dr. W. M. Bogart, Chattanooga, aged 66, died May 29.

Dr. A. E. Ray, Tullahoma, aged 61, died suddenly June 4 as the result of an attack of acute indigestion.

TEXAS

The Texas Dermatological Society, at its annual meeting in San Antonio in May, elected the following officers for the coming year: Dr. C. F. Lehmann, San Antonio, President; Dr. Ben Eppright, Austin, Vice-President; and Dr. Everett R. Seale, Houston, reelected Secretary-Treasurer.

The Texas Neurological Society held its sixth annual meeting in San Antonio in May and elected the following officers for the coming year: Dr. Guy Witt, Dallas, President; Dr. J. A. McIntosh, San Antonio, First Vice-President; Dr. E. M. Perry, Dallas, Second Vice-President; and Dr. Wilmer Allison, Fort Worth, reelected Secretary-Treasurer.

The Texas Pediatric Society met in San Antonio in May and elected the following officers for the coming year: Dr. Ramsey Moore, Dallas, President; Dr. C. O. Terrell, Fort Worth, Vice-President; and Dr. F. H. Lancaster, Houston, Secretary-Treasurer.

The Texas Railway Surgeons' Association held its eighteenth annual meeting in San Antonio in May and elected the following officers for the coming year: Dr. Everett Jones, Wichita Falls, President; Dr. M. L. Langford, Mart, First Vice-President; Dr. Sidney Stout, Fort Worth, Second Vice-President; and Dr. Ross Trigg, Fort Worth, reelected Secretary-Treasurer.

The Texas Tuberculosis Association held its twenty-fifth annual meeting in Waco in April. Officers elected were: Mr. T. W. Hughen, Port Arthur, President; Mr. Murray G. Thames, Beaumont, Dr. Austin Leach, Wichita Falls, Vice-Presidents; Mr. J. W. Butler, Galveston, Secretary; and Mr. H. A. Wroe, Austin, Treasurer.

The Phi Beta Pi Alumni Association had a luncheon and business meeting during the State Association meeting in San Antonio in May, at which time Dr. Joseph C. Alexander, Dallas, was reelected Chairman; Dr. DeWitt Neighbors, Fort Worth, reelected Vice-Chairman; and Dr. C. M. Phillips, Levelland, was elected Secretary-Treasurer.

Dr. John W. Brown, State Health Officer, called a conference of city and county health officers during the State Association meeting in San Antonio. Eighty-five health officers attended.

Dr. Sim Hulsey and Dr. B. C. Ball, Fort Worth, are in New York taking postgraduate work at the Trudeau School of Tuberculosis at Saranac Lake.

Dr. H. S. Renshaw, Fort Worth, and Miss Carol Jim Roberts were married in April.

Dr. I. P. Barrett, Fort Worth, and Mrs. Blanche Grundy were married June 2.

Dr. Joe Thorne Gilbert, Austin, and Miss Ailine Burch were married in April.

Continued on page 30

INCRETONE

Bottles of 6 ounces

A Liquid Endocrine Tonic

with a positive pharmacologic action on the energy liberating mechanism of the body.

Increased energy from increased utilization of the foodstuffs.

G. W. CARNRICK CO. 20 MT. PLEASANT AVE. NEWARK, N. J.

We quote from page 54 of

"The Milk Question"

by **M. J. ROSENAU, Professor of Preventive Medicine and Hygiene, Harvard Medical School.**

"Man has but a single stomach and this forms about twenty per cent of the digestive tract. The cow has four stomachs which form about seventy percent of the digestive tract. The calf's stomach is well fitted to handle and digest the tough, lumpy curds which form from cow's milk. Woman's milk curdles into a soft mass which is broken into numberless small particles. Evidently the stomach of the infant fed with cow's milk is over-taxed trying to break the tough curds into particles small enough for complete digestion. It is therefore evident that even if we could secure cow's milk, the chemical composition of which was exactly the same as that of human milk, it would still be far from a perfect substitute unless it behaved similarly in the digestive tract."

SIMILAC is similar to breast milk not only in composition but in digestive properties as well. Like breast milk it forms an extremely fine, soft curd of consistently zero curd tension.

ACCEPTED AMERICAN MEDICAL ASSN. Council on Foods

Not advertised to the laity and no directions on or in the trade package. Samples for curd tests or trial feedings, literature and recorded results of feeding with SIMILAC will be mailed on receipt of a request on your prescription blank.

SIMILAC is made from fresh skim milk (casein modified) with added lactose, salts, milk fat, and vegetable and cod liver oils.

M & R
DIETETIC LABORATORIES, INC.,
COLUMBUS, OHIO.

Continued from page 28

DEATHS

Dr. Spencer Allen Collom, Sr., Texarkana, aged 67, died suddenly April 26 of heart disease.

Dr. J. B. Whitehead, Voss, aged 83, died February 1 in a Wichita Falls hospital of cerebral hemorrhage.

Dr. Beverly Caldwell, China Spring, aged 80, died April 21 of myocarditis.

Dr. Carl V. Barnes, Huntsville, aged 58, died April 5.

Dr. Gaius Fabius Brooks, Ysleta, aged 80, died April 28.

Dr. Hubert Rogers Kannenberg, Dallas, aged 29, died suddenly May 7 of angina pectoris.

Dr. Eugene Nesbit Gatlin, Brookshire, aged 79, died March 25 of cerebral hemorrhage.

Dr. M. E. McClure, Alto, aged 64, died suddenly March 23 of heart disease.

VIRGINIA

Dr. I. C. Riggin, Richmond, Director of Rural Health and Tuberculosis of the Virginia State Department of Health, has been appointed State Health Commissioner, effective July 1.

The Medical College of Virginia, Richmond, recently received a portrait of the late Dr. W. P. Brock, former President of the Alumni Association of the Medical College, presented to the School by members of the family.

Dr. W. F. Drewry, Richmond, was recently presented with a gold medal by the American Psychiatric Association, Dr. Drewry being one of the living former Presidents of the Association, each of whom received a similar medal from the Association.

The St. Philip Hospital, Richmond, held a postgraduate clinic for negro physicians in June.

A bronze tablet was recently unveiled on Chimborazo Hill, Richmond, marking the site of the Confederate Chimborazo Hospital, the largest military hospital in the world at that time.

Dr. W. A. Farmer and Dr. D. R. McEachern, Richmond, both on the surgical service of the Hospital Division of the Medical College of Virginia, have gone to Paris to fill appointments for a year's service at the American Hospital in Paris.

The Norfolk County Medical Society held its annual meeting in June and elected the following officers for the coming year: Dr. C. Carroll Smith, President; Dr. James W. Hunter, Vice-President; and Dr. Lockburn B. Scott, reelected Secretary-Treasurer; all of Norfolk.

The Medical College of Virginia announces the addition to its faculty of Dr. Hans Kleinmann, lately of the University of Berlin. Dr. Kleinmann will be Associate in Pathology.

Dr. James S. Dryden has located at Jeffs for general practice, after completing his internship at St. Vincent's Hospital, Norfolk.

Dr. Stephen J. Beeken has located at Cambria for general practice, after completing his internship at Lewis Gale Hospital, Roanoke.

Dr. F. L. Finch, formerly of Urbanna, has located at Richmond and will be associated with Dr. W. H. Parker in general practice

The Norfolk Protestant Hospital recently received a memorial gift of a new roentgen ray department supplied with the most up-to-date equipment, to be known as the F. S. Royster Memorial.

Dr. A. M. McLaughlin has located at Waynesboro to practice medicine, having completed his internship at Johnston-Willis Hospital, Richmond.

Alpha Epsilon Iota, national fraternity for medical women, held its biennial meeting in Richmond in June at the Richmond Academy of Medicine. After the business session delegates were entertained at luncheon by Dr. Regena Beck, Richmond.

Dr. H. Rudolph Hartwell, formerly of Troutville, has moved to Roanoke and opened offices in the Medical Arts Building.

Dr. J. A. Noblin, East Radford, is the newly elected President of the Radford Rotary Club.

A tenth series of postgraduate courses on prenatal and postnatal care will be conducted in northeastern Virginia, starting July 9.

Dr. Wilkins J. Ozlin, formerly connected with the medical staff of Catawba Sanatorium, has moved to South Hill for general practice and diseases of the chest.

Dr. O. O. Ashworth and Dr. Morton Morris Pinchney, both of Richmond, announce their association in the practice of medicine, with offices in the Medical Arts Building.

Dr. L. Jacobs has located at Norfolk, with offices in the Wainwright Building.

Dr. R. P. Hawkins, Jr., Clifton Forge, has been named one of the directors of the recently opened Mountain National Bank.

Dr. R. Angus Nichols, Jr., and Miss Elizabeth Williams, both of Richmond, were married June 1.

Dr. Rogers Newton Harris, Port Royal, and Miss Mary McLaughlin were married May 19.

Dr. William Beverley Wilkins, Alexandria, and Miss Gladys Nichols were married June 2.

Dr. Dawson Edward Watkins, Jr., Waynesboro, and Miss Mary Evelyn Stephenson were married June 23.

Dr. Archibald Cary Randolph and Mrs. Rebecca Dulaney McElhone, both of Upperville, were married June 2.

Dr. J. B. Tuttle and Mrs. Minnie H. Buchanan, both of Craigsville, were married June 7.

DEATHS

Dr. Dudley Henry Morris, University, aged 49, died March 29 of bronchopneumonia.

Dr. Ambler Caskie, Richmond, aged 78, died April 6.

Dr. Walter Edward Beattie, Alexandria, aged 29, died June 9 following an illness due to a throat infection.

Dr. Robert Hill Davis, University, aged 59, died June 19.

Dr. Chester Allen Amos, Alexandria, aged 41, died June 10 in an automobile accident.

Dr. Wyatt S. Beazley, Sr., Richmond, aged 66, died June 6.

Dr. Isaac Errett Wolfe, Coeburn, aged 57, died June 20 in a Richmond hospital.

WEST VIRGINIA

The American Gynecologic Society held its annual meeting at White Sulphur Springs in May.

Dr. Jesse McCall, recently of Pageton, has moved to Newton, New Jersey.

Dr. J. E. Hamner, Rainelle, has returned home and will resume his practice, specializing in diseases of the eye, ear, nose and throat, after taking postgraduate work at the Hospital Division of the Medical College of Virginia, Richmond.

Dr. Vernon L. Peterson has located at Charleston, where he will be in charge of the x-ray department of the Charleston General Hospital. Dr. Peterson comes from the Mayo Clinic, where he has been a Fellow for the past four years.

DEATHS

Dr. Martin V. Godbey, Charleston, aged 55, died April 26.

The "MESCO" Laboratories manufacture the largest line of Ointments in the world. Sixty different kinds. We are originators of the Professional Package. Specify "MESCO" when prescribing ointments. Send for lists.

Manhattan Eye Salve Co.

LOUISVILLE, KENTUCKY

Classified Advertisements

ALCOHOLISM (30 years' experience)—THE STOKES HOSPITAL, 923 Cherokee Road, Louisville, Kentucky. Telephone, East 1488. Absolute privacy. Treatment one of gradual reduction. Do not limit the quantity of whiskey used in treatment. Each patient treated as an individual case. Craving for alcoholic beverages destroyed; no physical injury incurred. Rates and folder on request.

ASSISTANCE OFFERED TO MEDICAL WRITERS. Research. Abstracts. Translations (all languages). Papers prepared from author's data. Ten years' experience with leading physicians and appointments on medical journals of highest standing. I employ no assistants; all my work is done personally and is reliable. Florence Arnan Carpenter, 413 St. James Place, Chicago, Ill.

"the most nearly *perfect* food"

. . . in an ideal state for feeding finicky appetites

When the appetite of your young patient lags and he toys with his food and refuses to drink milk, why not try to make the little food he does eat as nutritional as possible. Powdered whole milk, mixed with the dishes the child likes, will do the job nicely.

KLIM is the superior powdered whole milk containing all the food solids of milk in about one-eighth of its volume . . . proteins, minerals, butterfats, vitamins . . . everything but the water. An ounce of KLIM affords the caloric value of a glassful of milk. And it's so much easier to take, especially when used in a cereal, beverage, dessert, or cake.

KLIM is easier to digest and assimilate as it is specially produced from high-grade pasteurized milk. It gives you maximum milk ingestion in the minimum quantity.

This is but one of the splendid milk reinforced recipes that can easily be made with KLIM.

Cocoa

7 tablespoons KLIM
2 teaspoons cocoa
½ teaspoon sugar
1 cup water
Few drops of vanilla

Directions: Blend KLIM, cocoa, and sugar with a little water. Add remaining water and stir until smooth. Cook over direct flame 2 minutes, stirring constantly. Turn into double boiler, cover, and cook for 15 minutes. Add vanilla and beat with egg beater until frothy on top.

Volume: 1½ cups. Total calories 323.8.

Try KLIM clinically, doctor. We'll be glad to send you samples and booklets (Reinforced Diet Recipes) for patient distribution. Send for them now.

ACCEPTED AMERICAN MEDICAL ASSN.

KLIM

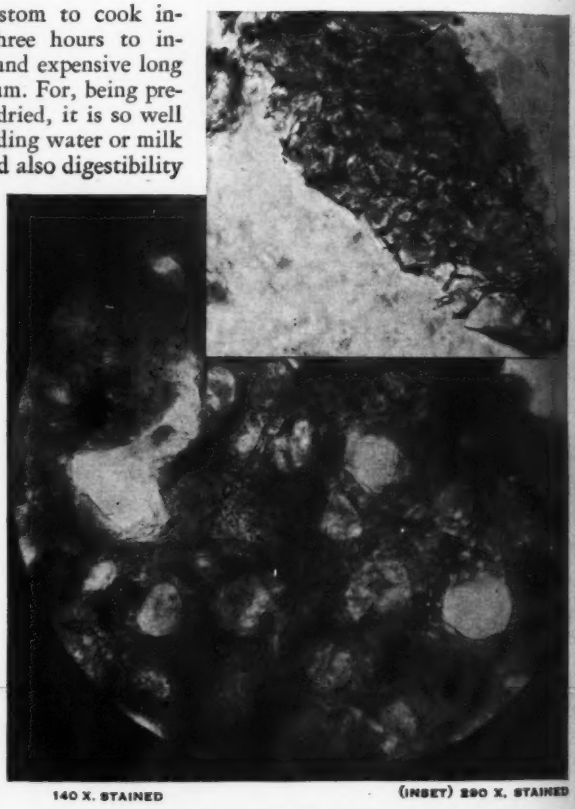
NRA WE DO OUR PART

THE BORDEN COMPANY, DEPT. 185, 350 MADISON AVE., NEW YORK, N. Y.

Why Starch of PABLUM *Is More Quickly Digested* than that of Long-cooked Cereals

FOR many years it has been the custom to cook infants' cereal one, two, and even three hours to increase its digestibility. This bothersome and expensive long cooking is proven unnecessary with Pablum. For, being precooked at 10 pounds steam pressure and dried, it is so well cooked that it can be served simply by adding water or milk of any temperature. Photomicrographs and also digestibility studies *in vitro* give evidence of this thorough cooking.

Fifteen cereals (both cooked and uncooked) studied microscopically were revealed as containing many starch granules, most of them massed into dense clumps. *Such unruptured clumps were never observed in hundreds of examinations of Pablum.* The latter consists, rather, of porous flakes which, like sponges, drink up liquids. Hence Pablum can be entirely saturated by the digestive secretions. This is borne out by studies of Ross and Burrill who found that the starch of Pablum is more rapidly digested than that of ordinary cereals cooked 4 hours.

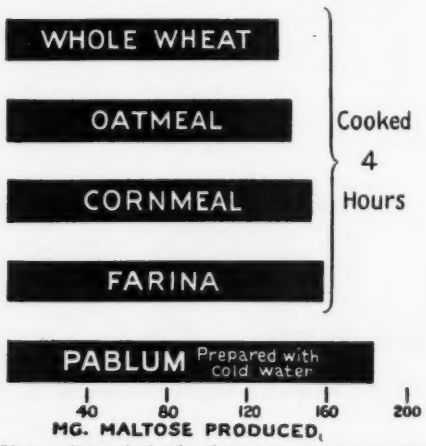


140 X. STAINED (INSET) 290 X. STAINED

Large photomicrograph: Pablum mixed with cold water—portion of large flake. Pablum flakes are honeycombed with "pores" or air-spaces (note light areas). This porosity permits ready absorption of digestive fluids by the entire flake. No starch granules appear—they have been completely ruptured.

Inset: Farina cooked ½ hour—clump of tissue including starch granules. Note density of clump and lack of porosity. Many starch granules, such as are present in raw cereal, remain unchanged in form.

Table shows that maltose production is much greater for Pablum prepared with cold water than for other cereals cooked 4 hours. Ross and Burrill (J. Pediat., May 1934) conclude from this and from the total soluble carbohydrate formed that starch digestion of Pablum is more rapid than that of 6 other cereals.

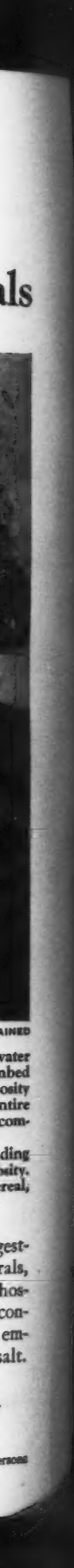


BESIDES being thoroughly cooked and readily digestible, Pablum supplies essential vitamins and minerals, especially vitamins A, B, E, and G, and calcium, phosphorus, iron, and copper. It is a palatable cereal consisting of wheatmeal, oatmeal, cornmeal, wheat embryo, alfalfa leaf, beef bone, brewers' yeast, and salt.

Reprint of Ross and Burrill paper sent on request of physicians.

MEAD JOHNSON & COMPANY
Evansville, Indiana, U.S.A.

Please enclose professional card when requesting samples of Mead Johnson products to cooperate in preventing their reaching unauthorized persons

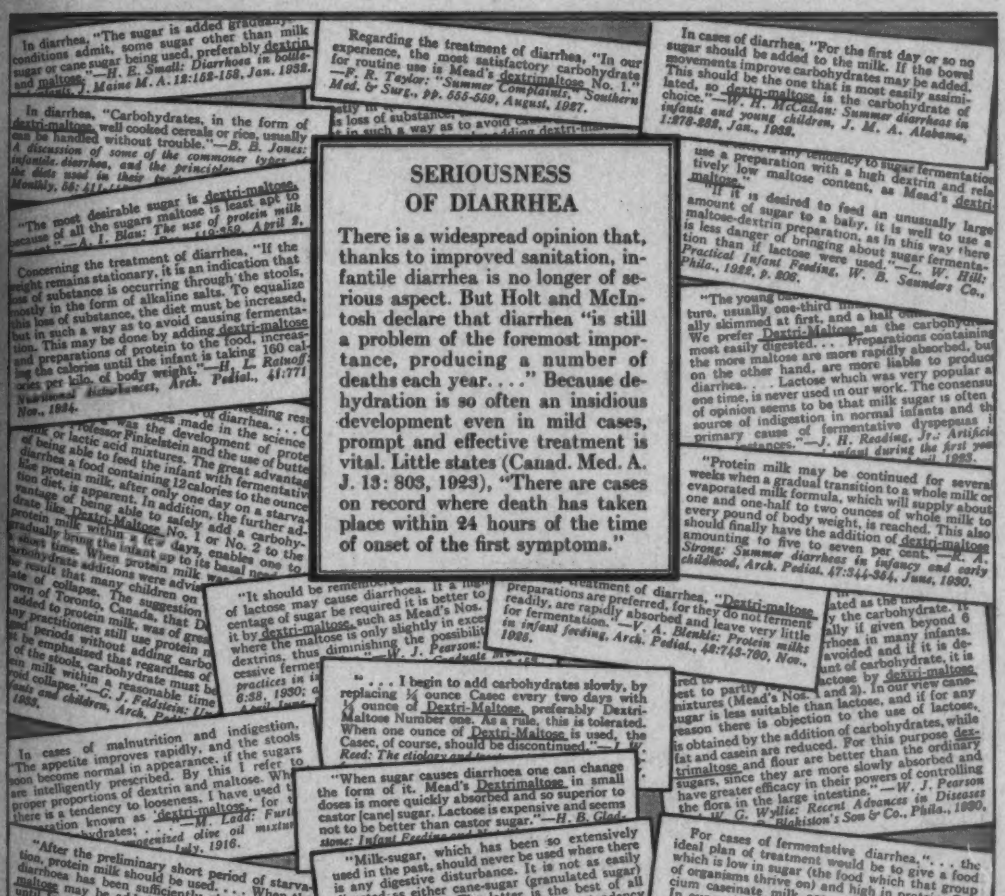


DIARRHEA

"the commonest ailment of infants in the summer months"

(HOLT AND McINTOSH: HOLT'S DISEASES OF INFANCY AND CHILDHOOD, 1933)

One of the outstanding features of DEXTRI-MALTOSE is that it is almost unanimously preferred as the carbohydrate in the management of infantile diarrhea.


In diarrhea, "The sugar is added gradually ... conditions admit, some sugar other than milk sugar or cane sugar being used, preferably dextrin and maltose."—H. E. Small: Diarrhoea in bottle-... J. Maine M. A. 12:152-158, Jan. 1932.
Regarding the treatment of diarrhea, "In our experience, the most satisfactory carbohydrate for routine use is Mead's dextrimaltose No. 1."—F. R. Taylor: "Summer Complaints," Southern Med. & Surg., pp. 555-559, August, 1927.
In cases of diarrhea, "For the first day or so no sugar should be added to the milk. If the bowel movements improve carbohydrates may be added. This should be the one that is most easily assimilated, so dextri-maltose is the carbohydrate of choice."—W. H. McCaslan: Summer diarrheas in infants and young children, J. M. A. Alabama, 1:278-282, Jan., 1933.
In diarrhea, "Carbohydrates, in the form of dextri-maltose, well cooked cereals or rice, usually can be handled without trouble."—B. B. Jones: A discussion of some of the commoner types of infantile diarrhea, and the principles ... the diets used in their ... Monthly, 58:41 ...
SERIOUSNESS OF DIARRHEA
There is a widespread opinion that, thanks to improved sanitation, infantile diarrhea is no longer of serious aspect. But Holt and McIntosh declare that diarrhea "is still a problem of the foremost importance, producing a number of deaths each year. . . ." Because dehydration is so often an insidious development even in mild cases, prompt and effective treatment is vital. Little states (Canad. Med. A. J. 13: 803, 1923), "There are cases on record where death has taken place within 24 hours of the time of onset of the first symptoms."
"The most desirable sugar is least apt to ... because of all the sugars maltose is ... of protein milk ..."—A. I. Blau: The use of ... 519-559, April 2, ...
Concerning the treatment of diarrhea, "If the weight remains stationary, it is an indication that loss of substance is occurring through the stools, mostly in the form of alkaline salts. To equalize this loss of substance, the diet must be increased, but in such a way as to avoid causing fermentation. This may be done by adding dextri-maltose and preparations of protein to the food, increasing the calories until the infant is taking 160 calories per kilo. of body weight."—H. L. Ratnoff: ... disturbances, Arch. Pediat., 41:771 ... Nov., 1924.
use a preparation with a high dextrin and relatively low maltose content, as Mead's dextri-maltose."
"If it is desired to feed an unusually large amount of sugar to a baby, it is well to use a maltose-dextrin preparation, as in this way there is less danger of bringing about sugar fermentation than if lactose were used."—L. W. Hill: Practical Infant Feeding, W. B. Saunders Co., Phila., 1922, p. 208.
"The young ... ture, usually one-third ... ally skimmed at first, and a half ... We prefer Dextri-Maltose as the carbohydrate most easily digested. . . . Preparations containing the more maltose are more rapidly absorbed, but on the other hand, are more liable to produce diarrhea. . . . Lactose which was very popular a ... one time, is never used in our work. The consensus of opinion seems to be that milk sugar is often a source of indigestion in normal infants and the primary cause of fermentative dyspepsias ... stances."—J. H. Reading, Jr.: Artificial ... during the first year ... 1923.
"Professor Finkelstein was the ... made in the science of being able to feed the infant with fermentative diarrhea a food containing 12 calories to the ounce. Lean protein milk, after only one day on a starvation diet, is apparent. In addition, the further advantage of being able to safely add a carbohydrate like Dextri-Maltose No. 1 or No. 2 to the protein milk within a few days, enables one to gradually bring the infant up to its basal needs in a short time. When protein milk was ... carbohydrate additions were advised ... her result that many children on the ... rate of collapse. The suggestion ... town of Toronto, Canada, that D ... added to proteins milk, was of great ... any practitioners still use protein ... and periods without adding carbo ... be emphasized that regardless of ... of the stools, carbohydrate must be ... milk within a reasonable time ... fluid collapse."—C. J. Fiddian: ... fants and children, Arch. Pe ... 1928.
"Protein milk may be continued for several weeks when a gradual transition to a whole milk or evaporated milk formula, which will supply about one and one-half to two ounces of whole milk to every pound of body weight, is reached. This also should finally have the addition of dextri-maltose amounting to five to seven per cent. —K. A. Strong: Summer diarrheas in infancy and early childhood, Arch. Pediat. 47:344-364, June, 1930.
"It should be remembered ... of lactose may cause diarrhoea. If a high ... centage of sugar be required it is better to ... it by dextri-maltose, such as Mead's Nos. ... where the maltose is only slightly in excess ... dextrins, thus diminishing the possibility ... cessive fermentation."—W. J. Gerstenberger: ... practices in infancy, Arch. Pediat., 47:1-12, ... 6:38, 1930; ... April, ...
... preparations are preferred, for they do not ferment readily, are rapidly absorbed and leave very little for fermentation."—V. A. Blemke: Protein milks in infant feeding, Arch. Pediat., 42:749-760, Nov., 1925.
... ated as the ... y the carbohydrate. It ... ally if given beyond 6 ... rhoea in many infants. ... avoided and if it is de- ... unt of carbohydrate, it is ... actose by dextri-maltose. ... est to partly ... Nos. 1 and 2). In our view cane-sugar mixtures (Mead's Nos. 1 and 2), and if for any reason there is objection to the use of lactose, sugar is less suitable than lactose, and if for any reason there is objection to the use of lactose, is obtained by the addition of carbohydrates, while fat and casein are reduced. For this purpose dextrimaltose and flour are better than the ordinary sugars, since they are more slowly absorbed and have greater efficacy in their powers of controlling the flora in the large intestine."—W. J. Pearson ... W. G. Wyllie: Recent Advances in Diseases ... Blakiston's Son & Co., Phila., 1930, ...
"... I begin to add carbohydrates slowly, by replacing ½ ounce Casec every two days with ½ ounce of Dextri-Maltose, preferably Dextri-Maltose Number one. As a rule, this is tolerated. When one ounce of Dextri-Maltose is used, the Casec, of course, should be discontinued."—I. W. Reed: The etiology and ...
In cases of malnutrition and indigestion. "The appetite improves rapidly, and the stools soon become normal in appearance, if the sugars are intelligently prescribed. By this I refer to proper proportions of dextrin and maltose. When there is a tendency to looseness. I have used the ... for ... dextri-maltose ... ration known as ... dextrates; ... oil mixture ... emulsified olive oil ... July, 1916.
"When sugar causes diarrhoea one can change the form of it. Mead's Dextrimaltose in small doses is more quickly absorbed and so superior to castor [cane] sugar. Lactose is expensive and seems not to be better than castor sugar."—H. B. Glad ... stone: Infant Feeding and ...
"Milk-sugar, which has been so extensively used in the past, should never be used where there is any digestive disturbance. It is not as easily digested as either cane-sugar (granulated sugar) or dextri-maltose. The latter is the best of all sugars to use, especially if there is any tendency to looseness of the bowels."—A. Brown: The Normal Child; Its Care and Feeding, F. D. Goodchild Company, Toronto, 1923, p. 180.
"After the preliminary short period of starvation, protein milk should be used. . . . When the diarrhoea has been sufficiently checked, dextri-maltose may be added and gradually increased until from 4 to 6 tablespoons are being used."—W. L. Denney: Acute nutritional disturbances of infancy, Univ. West. Ontario M. J. 2:135-137, April, 1932.
For cases of fermentative diarrhea, ". . . the ideal plan of treatment would be to give a food which is low in sugar (the food which that group of organisms thrive on) and high in protein. Calcium caseinate milk accomplishes this purpose. In our series of cases, we found it was necessary to use the casein calcium for from 5-8 days; we then stopped it and added dextri-maltose to the formula."—A. G. DeSanctis and L. V. Paider: The value of calcium caseinate milk in ... diarrhea, Arch. Pediat. ...

Just as DEXTRI-MALTOSE is a *carbohydrate* modifier of choice, so is CASEC (calcium caseinate) an accepted protein modifier. Casec is of special value during the summer months (1) for colic and loose green stools in breast-fed infants; (2) in fermentative diarrhea in bottle-fed infants, (3) as a prophylactic against diarrhea in infections.

When requesting samples of Dextri-Maltose, please enclose professional card to cooperate in preventing their reaching unauthorized persons.

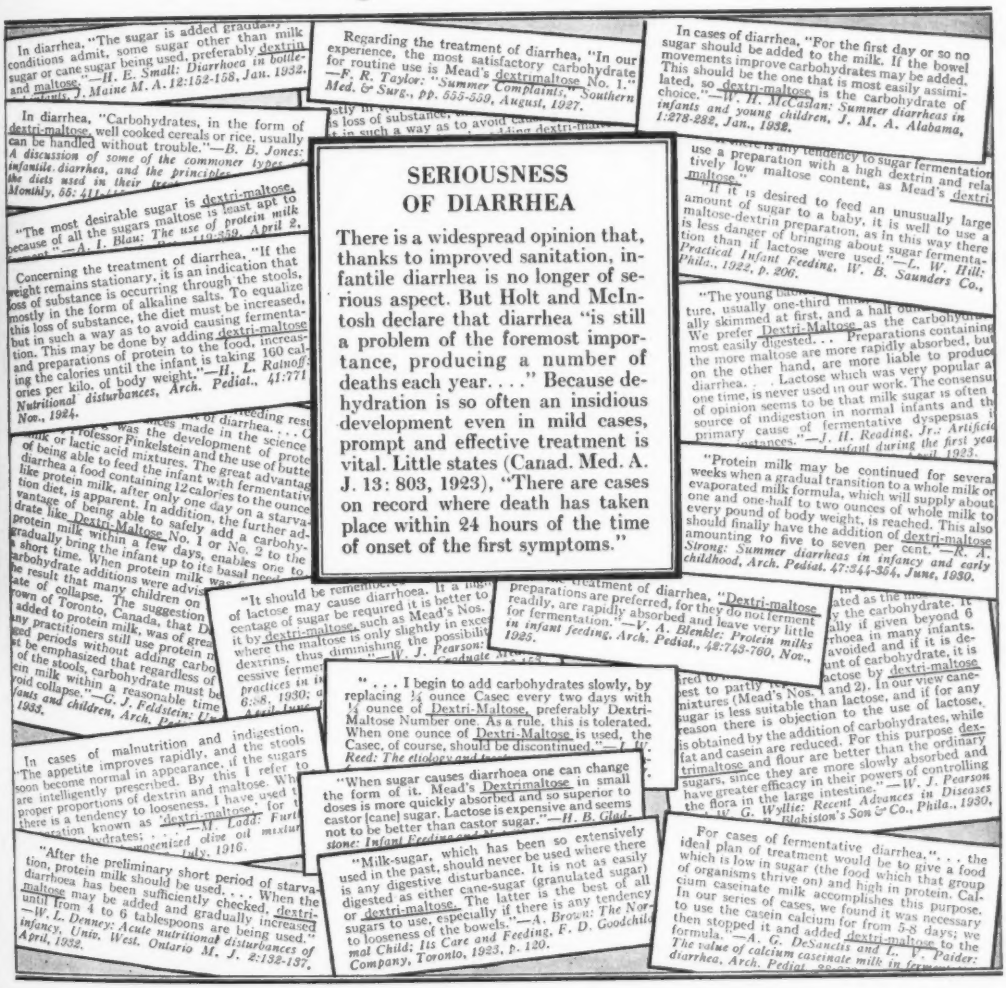
MEAD JOHNSON & CO., EVANSVILLE, INDIANA, U.S.A.

DIARRHEA

"the commonest ailment of infants in the summer months"

(HOLT AND McINTOSH: HOLT'S DISEASES OF INFANCY AND CHILDHOOD, 1933)

One of the outstanding features of DEXTRI-MALTOSE is that it is almost unanimously preferred as the carbohydrate in the management of infantile diarrhea.


In diarrhea, "The sugar is added gradually ... conditions admit, some sugar other than milk sugar or cane sugar being used, preferably dextrin and maltose."—H. E. Small: Diarrhoea in bottle-fed infants, J. Maine M. A. 12:152-158, Jan. 1932.
Regarding the treatment of diarrhea, "In our experience, the most satisfactory carbohydrate for routine use is Mead's dextrimaltose No. 1."—F. R. Taylor: "Summer Complaints," Southern Med. & Surg., pp. 555-559, August, 1927.
In cases of diarrhea, "For the first day or so no sugar should be added to the milk. If the bowel movements improve carbohydrates may be added. This should be the one that is most easily assimilated, so dextri-maltose is the carbohydrate of choice."—W. H. McCaslan: Summer diarrheas in infants and young children, J. M. A. Alabama, 1:278-282, Jan., 1933.
In diarrhea, "Carbohydrates, in the form of dextri-maltose, well cooked cereals or rice, usually can be handled without trouble."—B. B. Jones: A discussion of some of the commoner types of infantile diarrhea, and the principles underlying the diets used in their treatment, Modern Monthly, 55: 411-416, 1931.
SERIOUSNESS OF DIARRHEA
There is a widespread opinion that, thanks to improved sanitation, infantile diarrhea is no longer of serious aspect. But Holt and McIntosh declare that diarrhea "is still a problem of the foremost importance, producing a number of deaths each year. . . ." Because dehydration is so often an insidious development even in mild cases, prompt and effective treatment is vital. Little states (Canad. Med. A. J. 13: 803, 1923), "There are cases on record where death has taken place within 24 hours of the time of onset of the first symptoms."
"The most desirable sugar is dextri-maltose, because of all the sugars maltose is least apt to ..."—A. I. Blau: The use of protein milk ... April 2,
Concerning the treatment of diarrhea, "If the weight remains stationary, it is an indication that loss of substance is occurring through the stools, mostly in the form of alkaline salts. To equalize this loss of substance, the diet must be increased, but in such a way as to avoid causing fermentation. This may be done by adding dextri-maltose and preparations of protein to the food, increasing the calories until the infant is taking 160 calories per kilo. of body weight."—H. L. Rainoff: Nutritional disturbances, Arch. Pediat., 41:771 Nov., 1924.
"Protein milk may be continued for several weeks when a gradual transition to a whole milk or evaporated milk formula, which will supply about one and one-half to two ounces of whole milk to every pound of body weight, is reached. This also should finally have the addition of dextri-maltose amounting to five to seven per cent."—R. A. Strong: Summer diarrheas in infancy and early childhood, Arch. Pediat. 47:344-354, June, 1930.
"It should be remembered ... diarrhea. If a high ... of lactose may cause diarrhoea. It is better to ... centage of sugar be required it is better to ... it by dextri-maltose, such as Mead's Nos. ... where the maltose is only slightly in excess ... dextrins, thus diminishing the possibility ... cessive ferme ... practices in ... 6:38, 1930;
"... I begin to add carbohydrates slowly, by replacing ¼ ounce Casec every two days with ¼ ounce of Dextri-Maltose, preferably Dextri-Maltose Number one. As a rule, this is tolerated. When one ounce of Dextri-Maltose is used, the Casec, of course, should be discontinued."—I. M. Reed: The etiology and ...
"When sugar causes diarrhoea one can change the form of it. Mead's Dextrimaltose in small doses is more quickly absorbed and so superior to castor [cane] sugar. Lactose is expensive and seems not to be better than castor sugar."—H. B. Glad... stone: Infant Feeding and ...
"Milk-sugar, which has been so extensively used in the past, should never be used where there is any digestive disturbance. It is not as easily digested as either cane-sugar (granulated sugar) or dextri-maltose. The latter is the best of all sugars to use, especially if there is any tendency to looseness of the bowels."—A. Brown: The Normal Child; Its Care and Feeding, F. D. Goodchild Company, Toronto, 1923, p. 120.
In cases of malnutrition and indigestion, "The appetite improves rapidly, and the stools soon become normal in appearance, if the sugars are intelligently prescribed. By this I refer to proper proportions of dextrin and maltose. Wh... there is a tendency to looseness, I have used ... known as 'dextri-maltose,' for ... hydrates; ... olive oil mixtur... July, 1916.
"After the preliminary short period of starvation, protein milk should be used. . . . When the maltose has been sufficiently checked, dextri-maltose may be added and gradually increased until from 4 to 6 tablespoons are being used."—W. L. Denney: Acute nutritional disturbances of infancy, Univ. West. Ontario M. J. 2:132-137, April, 1932.
... preparations of diarrhea, "Dextri-maltose ... are preferred, for they do not ferment ... for fermentation."—V. A. Blenkle: Protein milks in infant feeding, Arch. Pediat., 42:743-760, Nov., 1925.
... use a preparation with a high dextrin and relatively low maltose content, as Mead's dextri-maltose."
"If it is desired to feed an unusually large amount of sugar to a baby, it is well to use a maltose-dextrin preparation, as in this way there is less danger of bringing about sugar fermentation than if lactose were used."—L. W. Hill: Practical Infant Feeding, W. B. Saunders Co., Phila., 1922, p. 206.
... ture, usually one-third ... ally skimmed at first, and a half ... We prefer Dextri-Maltose as the carbohydrate most easily digested. . . . Preparations containing the more maltose are more rapidly absorbed, but on the other hand, are more liable to produce diarrhea. . . . Lactose which was very popular at one time, is never used in our work. The consensus of opinion seems to be that milk sugar is often a source of indigestion in normal infants and the primary cause of fermentative dyspepsias ... stances."—J. H. Reading, Jr.: Artificial ... infant during the first year ... 1923.
... ated as the ... ly the carbohydrate. It ally if given beyond 6 rhoea in many infants. avoided and if it is deant of carbohydrate, it is actose by dextri-maltose ... and 2). In our view cane-... mixtures (Mead's Nos. ... sugar is less suitable than lactose, and if for any reason there is objection to the use of lactose, is obtained by the addition of carbohydrates, while fat and casein are reduced. For this purpose dextri-maltose and flour are better than the ordinary sugars, since they are more slowly absorbed and have greater efficacy in their powers of controlling the flora in the large intestine."—W. J. Pearson ... G. Wyllie: Recent Advances in Diseases ... Blakiston's Son & Co., Phila., 1930,
For cases of fermentative diarrhea, ". . . the ideal plan of treatment would be to give a food which is low in sugar (the food which that group of organisms thrive on) and high in protein. Casein caseinate milk accomplishes this purpose. In our series of cases, we found it was necessary to use the casein calcium for from 5-8 days; we then stopped it and added dextri-maltose to the formula."—A. G. Desanctis and L. ... Paider: The value of calcium caseinate milk in ... diarrhea, Arch. Pediat. ...

Just as DEXTRI-MALTOSE is a *carbohydrate* modifier of choice, so is CASEC (calcium caseinate) an accepted *protein* modifier. Casec is of special value during the summer months (1) for colic and loose green stools in breast-fed infants; (2) in fermentative diarrhea in bottle-fed infants, (3) as a prophylactic against diarrhea in infections.

When requesting samples of Dextri-Maltose, please enclose professional card to cooperate in preventing their reaching unauthorized persons.

MEAD JOHNSON & CO., EVANSVILLE, INDIANA, U.S.A.

ANTISEPTIC SOLUTIONS *for* MUCOUS MEMBRANES

THE antiseptic solution to be applied to a delicate membrane should preferably be non-irritating; yet it should be effective.

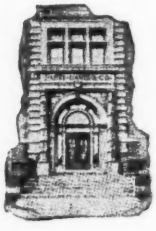
Neo-Silvol solutions are bland; they may be used in the eye without injuring or irritating the conjunctiva. But Neo-Silvol is an effective antiseptic agent, useful in affections of the eye, nose, throat, and genito-urinary tract.

Neo-Silvol solutions up to 50% strength may be made without difficulty, dropping the crystals into water and shaking in a stoppered bottle.

Neo-Silvol solutions are practically non-staining.

Neo-Silvol (Colloidal Silver Iodide Compound) is supplied in 1-ounce and 4-ounce bottles; also in bottles of 50 and 500 six-grain capsules.

Neo-Silvol (Colloidal Silver Iodide Compound) is accepted for N. N. R. by the Council on Pharmacy and Chemistry of the A. M. A.



PARKE, DAVIS & CO. DETROIT, MICHIGAN

DEPENDABLE MEDICATION BASED ON SCIENTIFIC RESEARCH